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Handset Handbook for the

Siemens Type 900 and 750

Family of Traffic Controllers

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Part Number	Issue	Change Ref	Date
667/HH/32900/000	2	TS004349	February 2008
	3	TS004417	March 2008
	4	TS004917	February 2009
	5	TS005115	June 2009
	6	TS005217	February 2010
	7	TS005637	August 2010
	8	TS006244	October 2011
	9	TS006625	July 2012

SAFETY WARNING

In the interests of health and safety, when using or servicing this equipment the following instructions must be noted and adhered to:

(i) Only skilled or instructed personnel with relevant technical knowledge and experience, who are also familiar with the safety procedures required when dealing with modern electrical/electronic equipment, are to be allowed to use and/or work on the equipment. All work shall be performed in accordance with the Electricity at Work Regulations 1989 or the relevant local, state and government regulations.

(ii) Such personnel must take heed of all relevant notes, cautions and warnings in this Handbook and any other Document or Handbook associated with the equipment including, but not restricted to, the following:

(a) The equipment must be correctly connected to the specified incoming power supply.
(b) The equipment must be disconnected / isolated from the incoming power supply before removing any protective covers or working on any part from which the protective covers have been removed.
(c) In the event of any person working elsewhere on the junction the Mains Supply to the controller must be switched off and the master switch locked in the ‘off’ position.

WARNING

Removing the Electricity Board Fuse or Switching off the Controller switch or the Manual Panel Signals On/Off switch does not guarantee isolation of the equipment.

WARNING

These controllers require specific configuration to enable them to function correctly when installed.

The configuration process is a complex activity. It should only be carried out by persons who are adequately trained, have a full understanding of the needs of the county or region where the controller is to be used, and are experienced in the tasks to be undertaken.

Safety Warning - Lithium Battery

The Controller contains a Lithium battery.

Do not short circuit, recharge, puncture, take apart, incinerate, crush, immerse, force discharge or expose to temperatures above the declared operating temperature range of the product, otherwise there is a risk of fire or explosion..

Batteries should be handled and stored carefully to avoid short circuits. Do not store in disorderly fashion, or allow metal objects to be mixed with stored batteries. Keep batteries between -30°C and 35°C for prolonged storage.

The batteries are sealed units which are not hazardous when used according to these recommendations. Do not breathe vapours or touch any internal material with bare hands.

Battery disposal method should be in accordance with local, state and government regulations. In many countries, batteries should not be disposed of into ordinary household waste. They must be recycled properly to protect the environment and to cut down on the waste of precious resources.

There are various RJ45 connectors used to connect to Lamp Switch and I/O cards in the controller. These are not Ethernet ports and should not be connected to other equipment, including PCs.

TABLE OF CONTENTS

1 INTRODUCTION

1.1 Overview

Access to the traffic controllers' timings and status information is gained by entering commands on an approved handset and interpreting the response on the display.

This handbook assumes that the user is familiar with the information provided in the General Handbook for the controller. These are listed in section 1.3.

This document lists all the handset command mnemonics for the firmware (PB801) used on the ST900 and ST750 families of traffic controllers.

The document has been sub-divided in to several sections, each covering a different part of the handset system and how the handset is used to access information within the controller. A summary of each section is given on page 9.

In a printed copy of this handbook for Installation and Maintenance Engineers, the optional appendix (section 14) may be omitted. It contains details on the handset commands typically only required by Configuration Engineers, i.e. print up to, but not including page 161.

1.2 Contact Us

If you have any comments on this handbook, or need any further information, you can contact us at trafficwebmaster.stc@siemens.com.

1.3 Related Documents

The following documents are referred to in the text of this handbook and may be useful for reference.

667/HB/32900/000	ST900 Family General Handbook
667/HE/33900/000	Installation, Commissioning and Maintenance Handbook for the ST900 Controller
667/HE/32900/000	Installation, Commissioning and Maintenance handbook for the ST900 ELV Controller
667/HB/32750/000	ST750ELV General Handbook (includes Installation, Commissioning and Maintenance)
667/HB/33750/000	ST750 General Handbook (includes Installation, Commissioning and Maintenance)
667/HB/32921/007	Handbook Supplement for monitoring Helios CLS (NLM) Signals [using an "LED Lamp Switch" Card]

1.4 Document Revision History

Issue	Summary of the Changes
1	First revision.
2	• Section 1.4 “Document Revision History” added. • The commands KTE/KTR/KTD have been modified; new Lamp Monitor diagnostics added in PB801 issue 6 (ref 0003636). • Minor corrections and document repaginated for clarity.
3	• Warning on the configuration process added.
4	Changes for the ST750 and ST750ELV Controllers, including • Description of FLF 21 / FLD 7:12 added for the ST750ELV • Description of FLF 30 added for the ST750 and ST750ELV • Description of FLF 45 and 46 added for the ST750 Other significant changes: • Changes to the KLV and KLT handset commands. • New fault code FLF 56 added (related to KLT). • 3.2 & 3.11: Improvements to the Handset types and interface sections. • Lamp monitoring configuration commands moved from 9.1 to 9.8. The following problem reports were also implemented: • 0003827: Changes to the SLL command for PB801 issue 7. • 0004038: Correction to ENG 52, UTCAIN • 0004051: Description of PDD made clearer • 0004125: More information added to FLF 9:255 LSPF • 0004160: Add FLF 2:251 (PHS incompatible) • 0004401: Description of ENG 227 modified (PHP compatibility) • 0004491: Add more notes on FLF 11 for faulty config PROM. • 0004786: Low limit warning added to LBT/LDT.
5	Changes for “LED Lamp Switch” (also see 667/HB/32921/007). Other significant changes: • New command “LED”; extinguish the mimic LEDs on LSLS Cards (ref 0002949). • New fault log flag “FLF 61:255 TKE!” (ref 0005012) The following problem reports were also implemented: • 0004896: IPS can also be used on outputs; not clear in the handbook • 0004897: LBT in section 5.5 should refer to FLF 17 • 0005037: KEV can now calibrate the lamp supply voltage reading • 0005039: KLT and KLV changed to allow independent Dialight and Futurit profiles • 0005166: Add words about High Dim causing unexpected load increases (9.5.3) • 0005198: DFA setting also controls the state of the input when an I/O card fails • 0006492: Improved words relating to FLF 2:253
6	Section 4.6 improved to identify major faults and ‘auto-reset’ faults (ref 0008348) and explicitly list all the fault data bytes used by FLF 3 (CORR), FLF 5 (CFT), FLF 22 (RLM) and FLF 33 (LOUT). The following problem reports were also implemented: • 0004929: KES to show reason for no current reading (page 115) • 0003981 and 0006843: New PMV values (page 101)
7	Various formatting changes plus inclusion of changes for PB801 issue 11: • 0008551: Problem with KDP:2 fixed in PB801 issue 11 (page 75) • 0009101: FAC 21:00000100 added (page 71) • 0009368: Replace ‘Major Fault’ with ‘Shutdown’ in section 4.6. • 0009571: Improvements to the KTR display (page 127) • 0009588: Silux profile added to KLV and KLT (pages 123 & 124) • 0009790: Added ‘[RLM:0]’ to the list of KES flags (page 115) • 0009792: Interaction between the KLT and RLM commands (125) • 0009933: Various minor changes to add ST750LED.

Issue	Summary of the Changes
8	Changes for PB801 issue 12 and other minor changes: • 0009129 & 0009649: Added new handset command “CFF”. • 0009219: No. Conditioning Timers increased from 96 to 480. • 0011335: FLF 3 and FLF 2:20 reports with ‘fail to part-time’.
9	Changes for PB801 issue 13 and other minor changes: • 0015877: Added profile KLT s:8. • 0015795: Improve the wording for FLF17 and the LST mnemonic.

1.5 Abbreviations

AC ..... Alternating Current
CLF..... Cableless Linking Facility
DC ..... Direct Current
DFM..... Detector Fault Monitor
ELV..... Extra Low Voltage
EPROM ..... Erasable Programmable Read Only Memory
FT ..... Fixed Time
GPS..... Global Positioning System
HPU..... High Power Unit (for ELV Controllers)
I/G..... Intergreen
I/O..... Input/Output
IC4..... Intersection Configurator version 4
IMU..... Integral Monitoring Unit
LED ..... Light Emitting Diode
LMU..... Lamp Monitor Unit
LRT..... Light Rail Transit
LSLS..... Low Voltage / Serial Lamp Switch
LV ..... Low Voltage (Mains)
mA ..... milliamps
MOVA..... Microprocessor Optimised Vehicle Actuation
mS ..... milliseconds
MTCS ..... Master Time Clock System
OMU..... Outstation Monitor Unit
OTU..... Outstation Transmission Unit
PCB ..... Printed Circuit Board
PHS ..... Phase Bus Serial Interface Card
PROM..... Programmable Read Only Memory
RAM ..... Random Access Memory
RLM..... Red Lamp Monitoring
RMS ..... Remote Monitoring System
rms ..... Root Mean Square
ROW..... Right Of Way
RTC ..... Real Time Clock
SA..... Speed Assessment
SDE ..... Speed Discrimination Equipment
SDE/SA Speed Discrimination Equipment / Speed Assessment
ST750..... ‘Siemens Type 750’ Family of Traffic Controllers
ST800..... ‘Siemens Type 800’ Family of Traffic Controllers
ST900..... ‘Siemens Type 900’ Family of Traffic Controllers
STC ..... Siemens Traffic Controls
UTC ..... Urban Traffic Control
VA..... Vehicle Actuated
ZXO ..... Zero Cross Over

1.6 Document Structure

The document has been sub-divided in to several sections, each covering part of the handset system and how the handset is used to access information within the controller...

Section 2 describes the **Controller** and its power-up sequence. It also highlights some of the main differences between the handset commands on this controller family and the ST800 and ST700 controllers.

Section 3 deals with how to connect the **Handset** to the controller and how to enter commands.

Section 4 is concerned with how to examine the **Fault Log**, the meaning of each fault flag and how to clear the faults.

Section 5 describes the other commands used to **Maintain and Monitor** the operation of the controller, i.e. the facilities and equipment configured, issue states, lamp supply, test facilities and status information such as current mode and stage.

Section 6 is concerned with the **Input and Output** and the associated commands and facilities, including DFM, SDE/SA, Call/Cancel and U/D.

Section 7 describes how to set the **Time** and the other commands associated with the master time clock, including the **Timetable** and the **Cableless Link Facility (CLF)**.

Section 8 details the handset commands used by each of the **modes of operation** of the controller, i.e. VA, fixed time, etc., as well as other facilities which affect the timings of the controller such as phase delays.

Section 9 covers commissioning and maintaining the **Lamp Monitor**, including the red lamp monitor and how to simulate lamp loads for test purposes.

Section 10 covers the **On-Street Configuration Facility** that allows junctions to be configured on the street using handset commands (not available in the UK).

Section 11 has been included to describe what has happened to many **T400** handset commands not described in the previous sections, i.e. why some of them have been deleted and why the others should no longer be required.

Section 12 contains a complete **Summary** of all the handset commands accepted by the traffic controller.

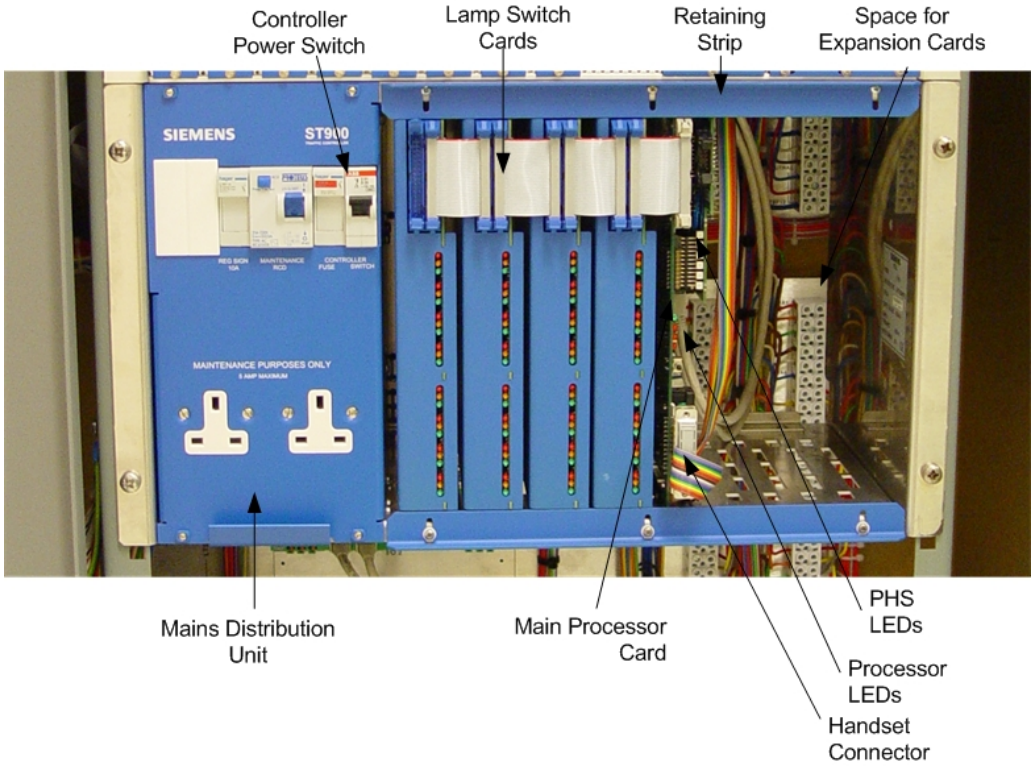
Section 13 is the **Index** which can also be used as a quick reference guide since each mnemonic listed in alphabetic order includes a short description, and each command appears a second time under its associated facility. For example, the commands associated with the call/cancel facility are listed under ‘C’ for ‘Call / Cancel’ as well as the commands themselves being listed under ‘D’ for ‘DCL’ and ‘DCN’.

Section 14 is an **Optional Appendix** containing details on the **Engineering Commands** used mainly by Configuration Engineers.

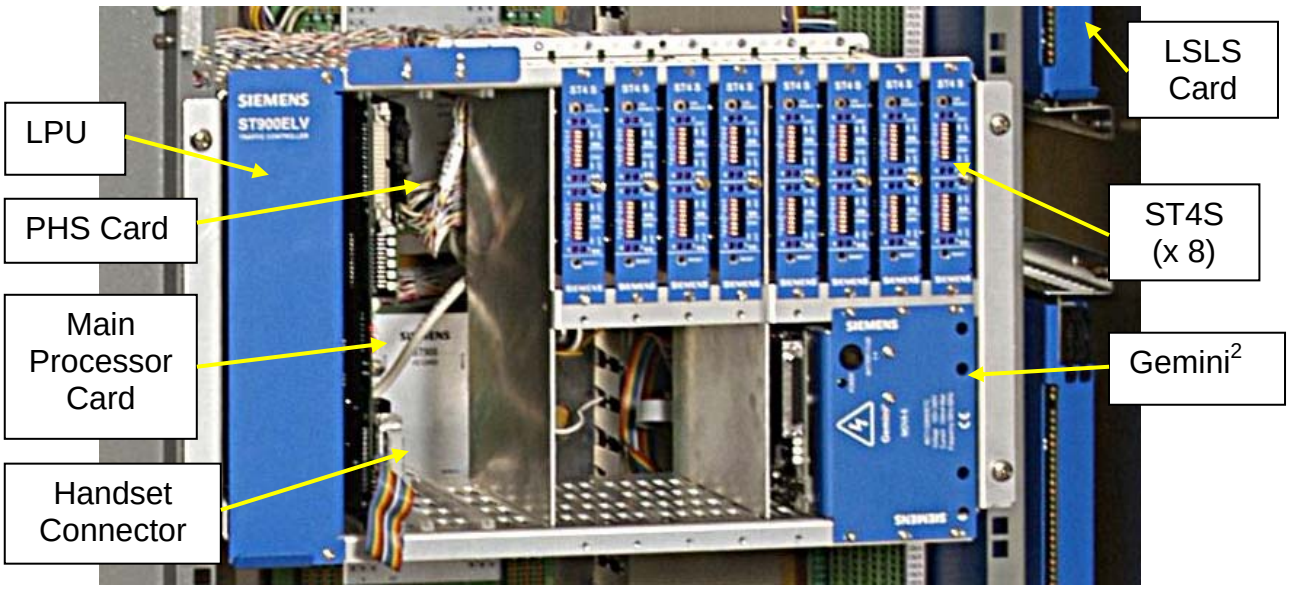
2 CONTROLLER OPERATION

2.1 The Controller

The figures below show an ST900 and an ST900 ELV controller in a 6U 19-inch rack. Other versions of the controller are also available. See the General Handbooks of the controllers for further information (see section 1.3 for details).



Note that a standard UK Mains Distribution Unit is shown. Other variations of the distribution unit are available.



2.2 Processor Card LEDs

There are four LED indicators on the front of the main processor card, described below.

The top one is green and is labelled ‘PP’ for power present. This LED will flash giving a heartbeat indication that the controller is running normally.

If it does not illuminate, there is no power to the main processor card. Check that controller is powered and that the power connector is inserted into the processor card.

The other LEDs are red and identify various fault conditions.

The top red LED is labelled ‘SE’ for System Error. This will illuminate during the power-up sequence and then will normally be extinguished when the controller is running normally with no faults present in its fault log. Section 4 starting on page 30 describes how to examine the fault log.

The middle red LED is labelled ‘BE’ for Bus Error. This LED should only illuminate if the processor has problems executing the firmware, e.g. when the firmware PROM is missing. This LED is not fitted on the ST750 main processor card.

The bottom red LED is labelled ‘WD’ for Watchdog. This LED will be illuminated when the ‘hardware watchdog circuit’ times-out. Note that when the firmware detects a serious fault, it will extinguish the signals and deliberately stop ‘kicking’ the hardware watchdog so that it times-out and reinforces the signals off (or flashing) state.

2.3 Starting the Controller

When the controller is initially powered up, the controller performs various internal checks before starting normal operation. While these checks are being performed, the green heartbeat LED will flicker and the red system error LED will remain on.

If these tests fail, it would point to a serious fault on the main processor card and the card should be replaced. The controller repeatedly writes the error message to the handset display at 1200 baud (7 data bits, even parity). No other handset operations can take place:

RAM FAULT	RAM read/write test fail
NEED 512KB OF RAM	More RAM is required by this firmware
DPR RAM FAULT	RAM read/write test fail (PHP Dual Port RAM)
PRG PROM FAULT	Program PROM fail
XTL FAULT	CPU and RTC crystal check fail
NO ST900 PHS DPR	RAM test executed on the PHS DPR area has failed.
PHS FAILURE	The PHS interface has failed.
PHS IS INCOMPATIBLE	The PHS is not compatible with the controller firmware.
ST700 NOT SUPPORTED	This version of firmware does not support the ST700.

Following the above internal checks, the controller will go on to check the contents of its battery backed RAM, e.g. the fault log and checksum on the configuration data, before attempting to switch on the signals.

Once the controller is running normally, it will extinguish the red system error LED and the green heartbeat LED will flash.

If the red system error LED remains illuminated, a handset can be connected and the fault log can be checked to see what errors exist. The fault log is described in section 4 starting on page 30.

For example, if this is the first time the controller has been powered, it will raise various memory faults (FLF 11:255 MEM) and a warning to say that (apparently) new firmware has been fitted (FLF 16:255 NEWF). In this case, just enter RFL=1 and power the controller off and back on to clear these faults

Alternatively, if the configuration PROM has just been changed (and “FLF 15:255 DIFC” is logged) enter the TKE, LRN, CNN initialisation commands and power the controller off and back on to load the configuration data into RAM.

2.4 Changes from the ST800/ST700 Controllers (PB800)

For those people familiar with the ST800 and ST700 Traffic Controllers, the following points in particular should be noted.

- The maximum number of **I/O Ports** supported by the firmware has been increased from 12 to 31, increasing the number of I/O Lines from 96 to 248.
- The ST900, ST900ELV and ST750ELV controllers support the new **Serial I/O** Cards and Intelligent Detector Backplanes. They do not support ST800 Expansion I/O Cards on the Extended System Bus, nor do they support the I/O on the CPU Card (indeed these 16 inputs and 4 outputs are not fitted on the ST900 version of the CPU Card). The ST750ELV controller has one 24/4 Serial I/O Card built-in.
- The **ST750** controller is very similar to the ST700 controller. It uses I/O built-in to its CPU Card and supports up to one ST800 Expansion I/O Card. It does not support the Serial I/O Cards and Intelligent Detector Backplanes of the other controllers.
- Integral **SDE/SA** should now be used by default. It no longer requires the /102 PLD. The SDE/SA Card on the Extended System Bus is still supported by the ST900 family of controllers, but should only be needed if the SoundMark Interface is required.
- The ST750ELV and ST900ELV controllers use intelligent lamp switch cards (**LSLS**) with full voltage monitoring on each output. Current and voltage monitoring is provided on each output so that any output may be used for any signal colour.
- Built-in drivers for pedestrian **'audible' devices** are available on the stand-alone pedestrian controllers ST750 (both streams) and ST750ELV (first stream only).
- The **version of firmware** residing in the PHS, LSLS and I/O cards can be viewed using the new commands PHS, VLS and VIO.
- **DFM Faults** on the individual I/O lines no longer appear in the Fault Log Data (FLD) and should be interrogated using the DSF handset command, which also displays the I/O Line Number and Name as well as indicating whether the input failed active (1) or inactive (0).
- The **'Reset DFM'** facility (RDF=1 for example) will now clear the DFM fault flag (FLF12) and extinguish the System Error LED.
- The 'Automatic Reset' option of **Bus Priority DFM Facility** (PDR) has been improved so that a number of activations can be specified; on the N'th activation the fault is automatically cleared and that activation is allowed.
- The handset now auto-detects Eight Data Bits with No Parity Bit (**8N**), as well as continuing to support Seven Data Bits with an Even Parity Bit (**7E**) at 1200, 9600 and 19200 bps.
- Level 2 (PME) and Level 3 (Pushbutton) Access **Timeout Periods** are restarted if Level 2/3 data is changed (including RFL=1 for example) or the PME access code is re-entered.
- The new **CID** handset command displays the firmware version (as entered on the IC4 Admin Screen) 'desired' by the configuration currently running a controller

(the EM number and issue of the configuration is still visible using the CIC handset command).

- The version of firmware required by a configuration is checked by the firmware before it is loaded and the existing configuration is erased. An “FLF 21:255 CPAT” fault is logged if the new configuration requires a later version of firmware. The version required by the configuration which it has failed to load can be seen using the new **CIE** handset command.

2.5 Controller Self-Test

The Self-Test facility can be used to check the hardware fitted to the controller, even without a configuration loaded. It has been designed for use in production and on the street by installation / maintenance engineers.

It is a completely separate function provided by the firmware with faults displayed on the handset directly; they do not affect the fault log (described in section 4). The handset command mnemonics described in this document are not used.

Self-Test is initiated by holding down the Level-3 access button while switching the controller’s power on. The button should be released once the green heartbeat LED starts to flash. The green heartbeat LED continues to flash during the Self-Test unless a fault is detected, when the red system error LED illuminates.

A handset connected displays information about the checks it is performing, such as the firmware issue and the lamp supply voltage, both dim and bright, and details any faults found. This text is always output at 1200 baud, using 7 data bits and even parity and the display device must be 20 characters wide by 4 lines high or larger.

Normal operation of the traffic controller is not affected in any way. When the power is switched off and back on again after the Self-Test, normal operation resumes as though nothing has happened.

For more information on the Self-Test facility, refer to the installation and maintenance documents for the specific controller (listed in section 1.3):

3 USING THE HANDSET

3.1 Connecting the Handset

The handset should be plugged into the 25 way D-Type connector on the front of the main processor card. See section 2.1 for details of where the main processor card is located and section 3.2 for specifics on the connection.

If the handset port is already occupied by a serial cable to another unit installed in the cabinet, **do not** unplug that cable, but plug the handset into that unit and it should provide a transparent handset link through to the controller. For example, connecting a handset to the Siemens Gemini unit and typing the command “XXC” will connect through to the traffic controller.

The controller normally communicates at 1200 baud using 7 data bits with one even parity bit and one stop bit. However it can also operate at 9600 or 19200 baud, or with 8 data bits, no parity bit and one stop bit;.

So that the controller can determine the baud rate and word size of the handset being used, the ‘return’, ‘enter’ or ‘CR/LF’ key should be pressed a number of times until ‘SIEMENS’ is displayed.

IMPORTANT

Since the controller waits until it is sure of the baud rate used by the handset, i.e. until ‘return’ has been keyed a number of times, the controller does not generate a prompt automatically on connection of a handset. This can ‘confuse’ older single-line display handsets for example; see section 3.11.2.

Also note that it is possible to inform the controller of the size of the handset being used, i.e. the number of characters that it can display on one line. This is described on page 21.

3.2 Handset Interface

Type

RS232C CCITT V24 and V28

Method of Connection

Controller - Cannon DP 25-way female socket connector
Terminal Device - Cannon DP 25-way male plug connector

Pin Allocation

Pin 1	-	-	Protective ground
Pin 2	→	TD	Transmit data ..... (from terminal to controller)
Pin 3	←	RD	Received data ..... (from controller to terminal)
Pin 4	→	RTS	Request to send ..... (used for hardware flow control)
Pin 5	←	CTS	Clear to send ..... (used for hardware flow control)
Pin 6	←	DSR	Data set ready ..... (set active by the controller)
Pin 7	-	-	Signal ground
Pin 9	-	-	5V supply (see below)
Pin 10	-	-	5V supply (see below)
Pin 18	-	-	5V supply return
Pin 19	-	-	5V supply return
Pin 20	→	DTR	Data terminal ready ..... (used to detect the presence of a handset)

Pins 9 and 10 are connected to the controller's 5-Volt logic supply (protected by a 500mA fuse) and can supply a maximum of 300mA (total).

Baud Rate

1200, 9600 or 19200 Baud – Auto-detected*

Bit Format

The Bit format may be either of the following – Auto-detected*

START BIT	1	2	3	4	5	6	7	PARITY	STOP BIT
(SINGLE BIT)	(LSB	•	•	•	•	•	MSB)	(EVEN)	(SINGLE BIT)

START BIT	1	2	3	4	5	6	7	8	PARITY	STOP BIT
(SINGLE BIT)	(LSB	•	•	•	•	•	•	MSB)	(NONE)	(SINGLE BIT)

Mode

Full duplex, Hardware Handshaking (using RTS and CTS)

Character Set

ISO Alphabet No. 5 (ASCII)

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* Auto-Detection of the Baud Rate and Bit Format is provided for normal handset mnemonic-based communications only. The unsolicited messages generated by the power-up checks (2.3), Self-Test (2.5) and 'Soft Errors' (4.7) are always transmitted using 1200 Baud, 7 Data Bits with Even Parity.

3.3 Access Levels

There are defined five levels of access to the controller:

Level 1..... Manual Control via the Manual Panel. (Police and Traffic Wardens)

Level 2..... Modify level 2 data items using a handset which may be sited remotely, e.g. at an Instation, and communicates with the controller via a RMS or UTC system. (Local Authority Traffic Engineer or Service Engineer, on-site or remotely via an OMU or OTU for example)

Level 3..... To change certain safety critical timings using a handset on-site and to initialise the Controller after the Configuration EPROM has been changed. (Local Authority Traffic Engineer or Service Engineer on-site)

Level 4..... Changing the Controller Configuration using the Configurator IC4

Level 5..... Changing the Controller Firmware PROM

This handbook describes how to use the handset to view and modify data within the traffic controller and therefore is not concerned with access levels '4' or '5'. A single letter or number identifies the access level required by each handset command:

Code	Access Level	Description
R	Read only	The data cannot be changed
O	Open access	The data can always be changed
2	Level 2	The PME security code needs to be entered first
3	Level 3	The button on the CPU card also needs to be pressed
X	Level 3+	Command used for on-street configuration, see section 10

To enable Level-2 access, enter the appropriate PME security code as described in information supplied separately to each user.

Level-2 access will remain enabled for approximately 20 minutes or until the handset is unplugged. Entering the PME security code again or changing any Level-2 or Level-3 data will give another 20 minutes of Level-2 or Level-3 access. Thus, while the user is actively modifying data (e.g. timings) the access level will not expire until no changes have been made for 20 minutes.

To enable Level-3 access, first enable Level-2 access then press and release the Level-3 button on the main processor card situated just above the handset connector to confirm to the controller that the operator is on-site.

There are two alternative ways of gaining Level-3 access, designed for when the handset is extended to the manual panel so that only the manual panel door needs to be opened.

1) If the 'lamp test' button on the manual panel is pressed within 30 seconds of entering the PME security code, Level-3 access is granted.

2) If the PME security code and 'LEV=3↵' are entered within 2 minutes of opening the manual panel door, Level-3 access is granted.

Note that 'LEV' shows the access level '2' or '3' obtained, '0' for none, or 'X' during on-street configuration mode (section 10).

3.4 Command Format

All operator commands commence with a three-character command code indicating the parameter to be monitored or changed. This 'mnemonic' is normally an abbreviation of the associated parameter making them easier to remember, for example, entering the mnemonic 'TOD' displays the 'Time Of Day' on the handset.

Following the three-character mnemonic may be one index or two indices. After the mnemonic and the indices (if any), the controller will display the current value of the parameter. A colon ':' is used to separate this from the mnemonic and indices.

For example, there is one minimum green time per phase, therefore the mnemonic 'MIN' uses one index to identify the phase and then displays the minimum green time for that phase.

Keystrokes	Display
MIN A↵	MIN A:5

Another example is the mnemonic 'IGN' that accesses the phase intergreens. These are specified on a 'phase to phase' basis and so this command requires two indices, one to specify the 'from' phase and the other to specify the 'to' phase. Therefore, to view the current value of the intergreen from Phase A to Phase B, the following command would be entered and then the result would be displayed:

Keystrokes	Display
IGN A B↵	IGN A B:5

To modify the value, the full command can be entered followed by an equal sign '=' and the new value required.

Keystrokes	Display
IGN A B=6↵	IGN A B:6

NOTE: Write access may need to be obtained before data can be modified (see page 17) and most commands have configurable range limits to limit the range of values that can be entered.

Once a command has been entered and the result is being displayed, the '+' and '-' keys can be used to display the information for the next or previous index. In the previous examples, the intergreen from Phase A to Phase B was explicitly requested, however the indices may be omitted and the '+' key used to scroll through the information starting with the first value:

Keystrokes	Display
IGN↵	IGN A A:NC
+	IGN A B:5
+	IGN A C:7
-	IGN A B:5

Once the required parameter is displayed, the value can be modified by simply entering '=' and the new value, without needing to re-enter the mnemonic and the indices:

Keystrokes	Display
IGN↵	IGN A A:NC
+	IGN A B:5
=	IGN A B=
6	IGN A B=6
↵	IGN A B:6

3.5 Handset Error Codes

If the command entered contains an error, the command is re-displayed up to the point at which the error was detected and one of the following error code letters is displayed.

For example, on an eight phase controller (Phases A to H), entering the following command results in the error message shown. In this case, the index 'I' is outside of the permitted range of values (Error Code '*R').

Keystrokes	Display
IGN I A↵	IGN I*R

Error Code	Name	Description
*A	Access Level	Access level for this command has not been enabled. See section 3.3.
*B	System Busy	The handset system is still busy storing the data from the previous command in to checksum protected RAM.
*C	Not Configured	The facility to which the command relates is not available on this controller.
*F	Fixed Index	The + and - keys are not applicable to current command.
*I	Inaccessible	The facility to which the command relates is not accessible, i.e. controller not configured to provide the facility or communications to that integral card have failed, e.g. Integral OTU or SDE.
*L	Lights On	The command will not be accepted until the signals are switched off using the signals' on/off switch on the manual panel.
*M	Mnemonic Not Recognised	The three-character command mnemonic is not recognised.
*N	Non-conflicting Phases	Phases specified in the proceeding intergreen command (IGN) are non-conflicting and this cannot be changed to conflicting and with the intergreen time specified using the handset.
*P	Premature End Of Line	The command line contains insufficient data, i.e. additional index or value input required.
*R	Range Error	The preceding value is out of range; i.e. is outside of the limits defined for that command.
*S	Syntax Error	Invalid character detected at the point immediately preceding the asterisk.
*V	Invalid Current Address	An '=', '+' or '-' operation has been attempted but no valid handset command is currently being displayed.
*W	Write Protected	Modification of the information specified in preceding command not permitted. The information is read only.
*X	Wrong Stream Type	An attempt has been made to change data on a stand-alone pedestrian stream with a command that is only applicable to intersection streams, or vice versa. Also see the description of the '!' character below…

The controller will display an exclamation mark '!' after an index if the command is not applicable to the type of stream to which the index applies, for example:

'IGN A! C:0' where the command is only applicable to intersection phases but phase A is a phase in a stand-alone stream, or

'PAR 1!:0' where the command is only applicable to stand-alone streams but stream 1 is an intersection stream.

3.6 Handset Command Memories

It is possible to store up to 10 handset commands in the controller's memory, so that they can be recalled with just a couple of key presses.

To store a command, firstly enter the command in the normal way, pressing '↵' as normal so the result is displayed. Then enter two dots and any number '0' to '9' to specify one of the ten memories to store the command in.

The handset may then be used to enter any other commands, and even unplugged and replaced.

For example, to store the fault log scan commands in commands memories '1' and '2', enter the following keystrokes:

Key Strokes		Display
FFS↵	(first command)	FFS END OF LOG
..	(two dots to store)	..
1	(in memory #1)	FFS END OF LOG
FDS↵	(second command)	FDS END OF LOG
..	(two dots to store)	..
2	(in memory #2)	FDS END OF LOG

To recall a stored command, just enter one dot this time and followed by the same number '0' to '9' as used to store the command.

So, to use the above commands to scan the fault log when the controller system error LED is illuminated, enter the following keystrokes:

Key Strokes		Display
.1	(recall memory #1)	FFS 18:255 PDFM
+	(next fault, if any)	FFS END OF LOG
.2	(recall memory #2)	FDS 32:00000001
+	(next fault, if any)	FDS END OF LOG

In this example, the controller fault flag 18 is set indicating a fault has been reported by the priority detector fault monitoring facility, and the fault data indicates the priority unit that has failed. The fault is described in detail on page 50.

The command buffers remain intact over normal power failures and are only cleared by a change of the configuration PROM. To explicitly clear a command memory, press '↵' so that only the prompt is displayed, then enter two dots and the number of the memory to be cleared.

3.7 Controller Input Simulation

While the contents of an I/O port are being displayed using the 'IOP' handset command, pressing the keys '0' to '7' will simulate the operation of the eight input lines on that port.

This facility does not require any access level to be enabled. The pulse, which lasts for 200mS, is inserted after any input inversions, i.e. pulse is always 'active', but before the handset and MTCS filter arrays. Any programming/conditioning to prevent these inputs will also prevent this input simulation.

3.8 Handset Displays

In addition to the rather 'static' displays described so far, the controller is in general constantly updating any display. For example, entering TOD displays the current time of day and this is updated as the time increments:

Keystrokes	Display
TOD↵	Mon05MAR07 15:24:35
	Mon05MAR07 15:24:36
	Mon05MAR07 15:24:37
	...

Note that although not clear from the above diagram, the new display will appear on the same line as the original, thus overwriting the old display, and not on the following line as the diagram may imply.

Also note that due to the restricted display width, the controller has dropped the mnemonic from the display. If the above example were repeated on a wider screen handset terminal, the following would be displayed. See page 21 for more information about display widths.

```
TOD:Mon 05-MAR-07 15:24:35
```

Functions whose data values change more often than once a second may not be accurately reflected on the handset display. For example, if IOP is used to display detector activations on an I/O port, very short activation of input may not appear on the handset display.

3.9 Handset Display Sizes

The traffic controller has been designed to work with a variety of different types of handset terminals. Compatible handsets are listed in section 3.11 starting on page 23.

It defaults to a 20-character display width to suit the more popular 20-character by 4-line handsets. This allows many commands to display more information than could be displayed on the single line 14-character handsets that used to be the norm. It also makes it less likely that the mnemonic is dropped to make room for the index and value.

A 14-character handset can still be used since most of these handsets allowed the display to be scrolled left and right in order to view longer displays. Alternatively, the display width can be explicitly limited to 14 characters by entering the open-access command 'WID=14↵'.

The command 'WID=80↵'can be used to increase the display width used by the controller to a maximum of 80 characters. Increasing the display width allows even more information to be displayed on a single line, and is particularly useful when viewing the historic rolling log for example (see page 31).

3.10 Full Screen Display

The handset system provides the option for a full screen status display showing the states of the lights and the I/O ports, and the displays from 10 handset commands, all updated simultaneously.

If a PC or other VT100 compatible terminal / terminal emulator are being used as a handset, it is possible to enable the controller's full screen status display. To inform the controller that the handset being used is large enough, the WID command is again used, but the value is 'WID=80x25↵'.

Once this has been enabled, pressing the '**$**' (dollar) key toggles the full screen status display ON and OFF. The status display splits the screen in two, with the top half displaying status information while the bottom half continues to function as a normal handset terminal.

While the full status display is active, pressing the '"' (double-quotes) key suspends normal handset operations and displays the 10 handset commands which have been stored in the command memories, see page 20. Pressing any key to start a new handset command switches off the handset command memories and restores normal handset operation, although the status information at the top of the screen is still updated.

Although the full screen status display can be used with any baud rate, it obviously functions much better at higher baud rates.

```
  A B C D E F G H I J K L M N O P Q R S T U V W X Y Z A2B2C2D2E2F2  AR S1 S2 NRM
R – 0 – 0 0 0 0 0 -                                                S3 S4 S5 MAN
A - - - 0 - - - - -                                                S6 S7 Aw F/T
G 0 – 0 - - - - - -                                                HC Hi PM V/A
0:00000000 5:00000000 10:00000000 5:00000000 20:00000000        CAB A1 A2 A3 CLF
1:00000000 6:00000000 11:00000000 6:00000000 21:00000000         SIGNALS OFF DIM
2:00000000 7:00000000 12:00000000 7:00000000 22:00000000 25:00000000 28:00000000
3:00000000 8:00000000 13:00000000 8:00000000 23:00000000 26:00000000 29:00000000
4:00000000 9:00000000 14:00000000 9:00000000 24:00000000 27:00000000 30:00000000
================================================================================
0) TOD:Tue 06-MAR-07 15:45:14
1) STS 0:VA-SETA S1-3 SDE
2) SPH A:MIN EXT+ MAX
3) SPH B:DEM
4) SPH C:MIN EXT  MAX
5) SPH D:DEM      SEQ
6) >
7) >
8) >
9) >
================================================================================
MAX F:30
MIN
MIN A:5
```

Note that if a VT100 compatible terminal is being used, regardless of whether the full screen status display has been enabled or not, the cursor keys are correctly interpreted by the controller. The up-arrow and down-arrow keys are particularly useful as they can be used to recall any one of the last 5 commands that have been entered. The recalled command can be re-submitted with or without modification, after it has been rejected due to a range error or an access level error for example.

3.11 Handset Types

3.11.1 Portable Handset Types

The controller will function with any terminal device capable of displaying ASCII text connected to the controller's handset port (section 3.2 on page 16).

The following portable terminal devices are available:
667/4/13296/000 Old Oyster handset [No longer recommended]
667/4/13296/001 TechTerm
667/4/13296/002 Oyster handset [Larger Screened]

In addition, any computer with a standard serial connection (as described in section 3.2, page 16) and standard terminal software can be used.

3.11.2 Oyster (Single Line Displays)

Older handsets tended to have a display that only contained one line of text. These are still supported by the controller, but with some limitations.

They cannot, for example, be used to monitor the progress of the Controller Self-Test because it generates text designed for a display containing at least four lines of 20 characters each in order to provide sufficient diagnostic information. For more details on the Controller Self-Test, refer to the Installation and Maintenance handbook for the controller.

If the handset being used has only a single-line display of less than 20 characters, refer to section 3.9 on page 21.

The old-style single-line Oyster handsets used the initial prompt to choose between its two speeds of 300 or 1200 baud. Since this initial prompt is no longer generated, the Oyster handset must be explicitly told to use 1200 baud before any other keys will function.

The first two keys on the top row select 300 and 1200 baud as detailed by the legend printed above them. Therefore, to select 1200 baud, simply press the 'BS' (backspace) key on the Oyster handset after it has powered up.

Once the baud rate has been selected, the handset will send any key presses to the controller, which will initially be used by the controller to determine the baud rate.

Therefore the 'BS' key should be pressed a number of times to firstly select 1200 baud; the controller will use subsequent key presses to determine the baud rate used by the handset. Also, by pressing 'BS' rather than 'return', no prompt is generated after the 'SIEMENS' banner and thus this remains on the screen.

3.11.3 Oyster 4/80

This section describes how to set up the Oyster 4/80 terminal for use as a handset. These settings are the same for many other types of traffic controller.

1) Connect the terminal to a controller.

2) Press ‘Cntrl’ and then ‘CR’, this starts the set-up function.

3) For each option, press ‘Y’ to step through the different settings until the required one is displayed, then press ‘N’ to select that setting as detailed below:

Handset Display	User Action Required
`BAUD=1200` `CHANGE ?`	Press ‘Y’ until ‘`1200`’ is displayed, Then press ‘N’.
`WORD=7D+E+1 STOP` `CHANGE ?`	Press ‘Y’ until ‘`7D+E+1 STOP`’ is displayed, Then press ‘N’.
`LINE MODE` `CHANGE ?`	Press ‘Y’ until ‘`LINE MODE`’ is displayed, Then press ‘N’.
`FOUR LINE MODE` `CHANGE ?`	Press ‘Y’ until ‘`FOUR LINE MODE`’ is displayed, Then press ‘N’.
`FLASHING OFF` `CHANGE ?`	Press ‘Y’ until ‘`FLASHING OFF`’ is displayed, Then press ‘N’.
`KEY REPEAT OFF` `CHANGE ?`	Press ‘Y’ until ‘`KEY REPEAT OFF`’ is displayed, Then press ‘N’.
`MAKE CHANGES` `PERMANENT Y/N ?`	Press ‘Y’ to save the settings.
`ARE YOU SURE ?`	Press ‘Y’ to confirm saving the settings.

4) The required settings for communications with most STC traffic equipment have now been saved.

5) If at any time ‘Ctrl’ is pressed, continue to press ‘N’ until the normal display is returned.

3.11.4 TechTerm

This section describes how to set up the TechTerm terminal for use as a handset. These settings are the same for many other types of Traffic Controller.

To enter the set parameters mode, simultaneously hold the CTRL and SHIFT keys while pressing F1. To move through the possible values for this parameter, press F1. To move through the list of parameters, press F2 to move forward or F3 to move backward. Both F4 and F5 return to terminal mode. Exiting by pressing F5 will provide an opportunity to save the selected values in the built-in non-volatile memory. Press F4 to exit without saving the settings. Exiting without saving the settings will leave any new setting in effect only until power is removed.

The terminal may be returned to the delivered configuration by applying power while simultaneously holding the CTRL, SHIFT and F1 keys. After the “SAVING DATA” message has appeared, the keys can be released. The procedure returns all of the parameters and the programmable function keys to the delivery configuration. Any changes made to the parameters and characters previously programmed into the function keys will be lost.

PARAMETER	OPTIONS (recommended settings are in bold)
BAUD	300-600-**1200**-2400-4800-9600
DATA BITS	**7**-8
PARITY	**EVEN**-ODD-MARK-SPACE-IGNORE
DISPLAY PE	ENABLE-**DISABLE**
REPEAT	**SLOW**-FAST-DISABLE
ECHO	ENABLE-**DISABLE**
HANDSHAKE	ENABLE-**DISABLE**
SELF TEST	ENABLE-**DISABLE**
POWER SAVER	**ENABLE**-DISABLE*

* Battery operated units only

3.11.5 TYCO Terminal

The TYCO terminal plugs into the **MODEM** port. To activate the interface, enter the command MDM=204<enter> and then switch the controller OFF and ON again.

Contact Siemens Poole for further information.

3.12 Standalone Pedestrian Controller's Configuration Data

These configurations are available on the IC4 CD. Other configurations may be produced by Siemens Poole in order to meet the particular requirements of an area or of one particular site.

These configurations need to be customised for particular installations using the handset, using the information in the Special Instructions of the configuration printout.

The commands to customise the controller are described in this handbook and in the Special Instructions. These allow facilities such as kerbside and on-crossing detectors and speed discrimination/assessment to be enabled or disabled. However, the fundamental lamp sequence (i.e. flashing green-man, red-man or blackout clearance periods) cannot be changed using the handset and is fixed in each of the default configurations.

The procedure for loading the configuration data into the controller without using a PROM is given below…

3.13 Procedure for Serial Configuration Loading

The following procedure should be used to send a new configuration from a PC to the controller. Note that IC4 will refuse to send a configuration to the controller if the controller is already running the same EM number and issue.

Rather than loading the configuration data in to the controller after it has been installed using a PC on the street, the configuration data could be loaded while the controller is still in the Field Service Centre and, provided the battery isolators are removed, this configuration data will still be present in the battery backed-up RAM when the controller is installed.

Step 1 Connect a standard RS232 serial cable to a PC serial communications port, e.g. COM1 or COM2. Connect the 25-way male connector of the cable to the controller's handset port on the main processor card.

Step 2 If IC4 is not already running, start the application in the usual way, e.g. from the Windows Start Menu. Note that loading a configuration into a controller does not require the IC4 dongle.

Step 3 From the IC4 menu, choose 'Options' and select 'Controller Communications'.

Step 4 Set the 'Port Number' to match the communications port where the serial cable was connected and select 'Ok'. The other options on this screen should not need changing from their default values.

Step 5 Now select the 'Send Configuration' line from the 'Controller' option on the menu. This will take you through the following steps to send a configuration to the controller.

Step 6 IC4 will now display a dialog box where the required configuration data file can be selected.

Step 7 IC4 will now attempt to establish communications with the controller.

If this fails, try the following:

- Check that the correct port number is specified in the options.
- Disconnect the cable from the controller for at least 5 seconds and then re-connect it and try again.
- Try communicating with the controller using a normal hand-held handset.
- Try communicating with the controller using a standard terminal application on the same PC.

Step 8 If communications could be established, IC4 will display a dialogue showing the EM number of the configuration about to be downloaded. Choose the 'Load' option to continue.

Step 9 In order to perform the configuration load, the controller needs to be given the level 2 access command (PME) and the level 3 initialisation commands (TKE, LRN, CNN) otherwise the controller will not accept the new configuration. IC4 opens a dialogue window into which these commands can be entered. Check that the controller accepts the commands in the response part of the window.

Note that the level 3 access button on the front of the controller's CPU card will need to be pressed before the level 3 commands are entered. Also, the initialisation commands will be rejected with a '*L' error while the signals on/off switch on the manual panel is in the 'on' position.

Step 10 IC4 will send the configuration to the controller (which shouldn't take more than a minute or so).

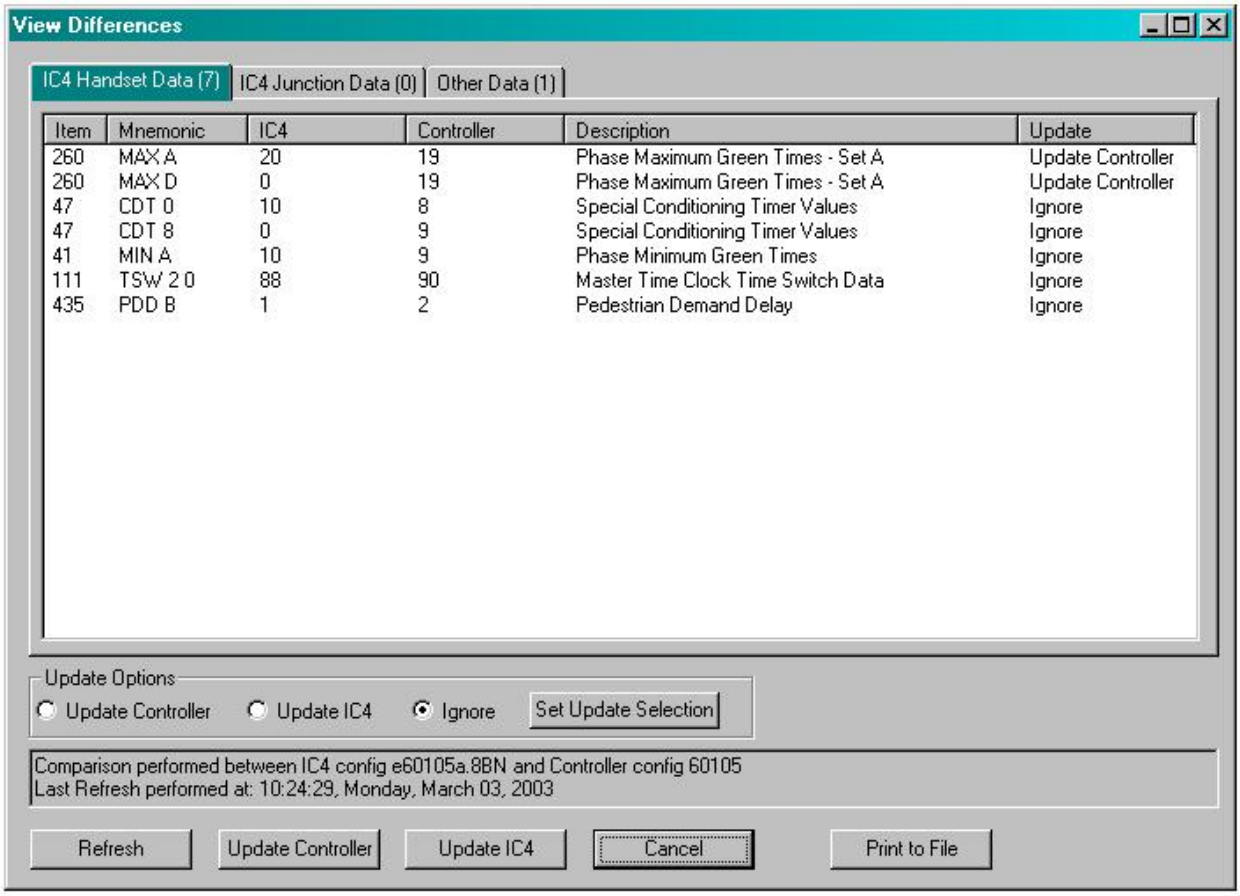
Step 11 Once loading is complete, another dialogue will appear asking for the level 2 access command (PME) to be entered and then the level 3 button to be pressed again.

Once IC4 has told the controller to use this new configuration data, the controller should be switched off and back on. If a configuration PROM was fitted to the controller, it should be removed while the power is switched off.

If one of the default stand-alone pedestrian configurations was loaded, the controller will need 'customising' using the handset as described in the special instructions pages of the print-out of the configuration before the signals are switched on.

3.14 IC4 View Differences

Once a controller has been configured by IC4 many items of configured data can be altered "on the street" via a handheld maintenance terminal. The IC4 View Differences facility enables the combined handset altered/configured data from the controller to be compared with the original configuration that was loaded in to the controller, or even a modified version of it. You also have the option of uploading the original IC4 configuration file from the controller itself.



The Refresh button initiates communication with the controller to upload the configured/handset altered data to the PC. If the EM number of the configured controller data differs from that of the selected IC4 configuration file a warning message appears but the procedure may be continued if required. Any differences between the data from the Controller, and the IC4 configuration selected when selecting the View Differences option, are displayed in the different tabs, depending on the type of data.

Junction data includes parameters and timings that cannot be modified via the maintenance terminal; such differences indicate that the configuration loaded in the controller is not exactly the same as the IC4 file used for the comparison, e.g. that the IC4 file has been modified after the configuration has been loaded in to the controller.

Handset data includes data that may be modified via the maintenance terminal. Each difference listed in the IC4 Handset Data window can be treated in one of three ways:

a) Downloaded to the controller (Update Controller), i.e the value listed in the IC4 column is sent to the controller and is treated as if it had been updated using a handset command.

b) Merged into IC4 (Update IC4), i.e the value listed in the Controller column is put into the IC4 .8SD file and saved and therefore will appear on the IC4 screen.

c) Ignored.

The ‘Print to File’ button will write the differences displayed on the screen to a text file (with the 8TX extension by default). An example of such a file is shown below:

```
                          IC4 View Differences Report


IC4 Handset Data

Item  Mnemonic IC4 Data          Controller Data     Description

373   DFS 19   0                  1                  DFM Suspended
209   DSI 1 0  18                 48                 DFM Inactive Time
209   DSI 1 1  18                 48                 DFM Inactive Time
209   DSI 1 2  18                 48                 DFM Inactive Time
209   DSI 1 3  18                 48                 DFM Inactive Time

IC4 Junction Data

Item  Mnemonic IC4 Data          Controller Data     Description



Other Data

Item  Mnemonic IC4 Data          Controller Data     Description

258   BSA      0                  14                 BST Advance (Week Number)
259   BSR      0                  44                 BST Retard (Week Number)
```

For more information on the View Differences facility, refer to the Help within the IC4 package itself.

4 THE FAULT LOG

4.1 Introduction

The controller's fault log holds all the currently active faults.

When the controller detects a fault, it sets the associated fault flag (to a non-zero value, usually 255) and may also set additional fault log data bytes. If any fault log flags are set, the red system error LED is illuminated.

In addition to the above fault log which holds the currently active faults, the traffic controller also contains a time stamped historic rolling log which records the time and date that various events occurred, such as when faults were detected.

4.2 Viewing the Fault Log

To display the currently active fault flags, enter 'FFS↵' (fast fault scan), and for the fault data, enter 'FDS↵' (fast data scan).

The '+' and '-' keys can then be used to scroll through the active faults. When there are no more faults, '`FFS END OF LOG`' is displayed.

For backwards compatibility, the 'FLF' (fault log flags) and 'FLD' (fault log data) handset commands still exist.

4.3 Clearing the Fault Log

Entering 'RFL=1' will reset the fault log of any active faults which no longer exist and extinguish the red system error LED on the main processor card providing no faults still exist.

Note that the historic rolling log is not cleared by entering RFL=1.

This MUST ONLY be used after all fault log entries have been investigated.

If the RFL display on the handset changes to a '0' after having been entered as a '1' and the error LED is also extinguished, all known faults will have been cleared and the fault log will have been reset.

If the RFL display on the handset changes to a '0' after having been entered as a '1' and the error LED is not extinguished, the controller believes the fault still exists and the fault log will still display the active fault.

If the RFL display on the handset changes to a '2' after having been entered as a '1', the controller needs to be switched off and back on before the fault can be cleared. Under these circumstances, the error LED will not be extinguished and the fault log will still display this fault until the power is switched off and back on.

4.4 Historic Rolling Log

The traffic controller contains a time stamped historic rolling log that records the time and date that various events occurred.

A time stamped entry is added to the log when:

- the controller is initialised, e.g. when a new configuration PROM is fitted,
- the power is switched off and back on, and whether a Self-Test was performed,
- when any FLF fault is set, e.g. '`MEM FLF 11:255, FLD 5:00000010`'
- when any FLF fault is cleared, e.g. '`MEM FLF 11:0`'
- when the lamp monitor is reset,
- when any lamp fails or is replaced,
- when any detector input fails DFM, when it next changes state, and when the fault is eventually cleared,

Note that this rolling log is not cleared when a new controller configuration is loaded or when the firmware PROM is changed. As long as the contents of the battery-backed RAM are preserved, the historic rolling log will remain intact.

The historic rolling log can be viewed on any size of handset, although it is easier to read on a larger device such as a laptop PC using 'WID=80' (see page 21). To view the historic rolling log, enter the command 'LOG↵'.

When 'LOG↵' is first entered, the most recent entry is displayed. While the most recent entry is being displayed, the display is automatically updated to show the most recent entry in the log when a new fault occurs.

To move through the historic log, use the normal '+' and '-' keys. The controller remembers your last position in the log, so if you type 'LOG↵' again after using another command, it will return you to your last position in the log.

To return to the end of the log, press <SPACE>. If the '+' key is then used, the most recent entries are displayed as before, but if the '-' key is used, the log can be viewed in the reverse direction, starting with the oldest entry still present in the rolling log.

If the power is switched off and back on, or the handset is disconnected, the next time that 'LOG↵' is entered, the most recent entry is always displayed.

The following sections describe the meaning of the entries in the historic rolling log.

4.4.1 Historic Rolling Log – Start-up and Shutdown Events

`POWER ON` ..... This event is recorded every time the controller starts, e.g. when the power is restored, unless a Self-Test is requested.

`POWER OFF` ..... This event is recorded when the controller's mains power is switched off or is too low.

`POWER OFF?` ..... This event is recorded when the power-up code (see KPU) is not one of the recognised values.

`CPU RESET` ..... This event is recorded when the software restarts but had no warning that the power was going to fail, i.e. the main processor has been reset but no warning of a power failure was received. If the controller is running normally and has not reported a 'PBUS FLF 2:5' fault, both processors have been reset not just the main processor.

`SELF TEST` ..... This event is recorded when a Self-Test has been performed.

`SHUTDOWN(SW)` ..... 'SHUTDOWN(SW)' is logged when the software detects an unexpected event. The rolling log will also attempt to record the 'BAD*nnnnn*' error number. See section 4.7 starting on page 68 for more details.

`ERROR:BAD`*nnnnn*

4.4.2 Historic Rolling Log – Lamp Monitor Learning

`LMU RESET` ..... This event is recorded when the lamp monitor is reset, either manually (e.g. KLR=1) or automatically (e.g. following controller initialisation).

`LMU BRI LRNT` ..... This event is recorded when the lamps have been learnt in the bright state and the KML=1 auto-learn facility (section 9.4) switches the supply dim.

`LMU DIM LRNT` ..... This event is recorded when the lamps have been learnt in the dim state and the KML=1 auto-learn facility switches the supply bright.

`LMU ALL LRNT` ..... This event is recorded when all the lamps have been learnt using the KML=1 auto-learn facility.

`LMU KML TMOUT` ..... This event is recorded when the KML=1 auto-learn facility times-out before all the lamp loads have been learnt.

4.4.3 Historic Rolling Log – Fault Log Entries

`CONTROL'R INI` ..... This event is recorded when the controller has been initialised, e.g. after the configuration PROM has been changed and the initialisation codes have been entered.

`MMMM FLF nn:vvv` .... When the value of fault flag 'nn' changes, an entry is placed in the rolling log showing the new value 'vvv'. Therefore, a non-zero value normally indicates that a fault has been detected and a value of zero indicates that the fault has been cleared. The rolling log also shows the three or four character abbreviation or mnemonic '`MMMM`' to help identify the meaning of the fault flag.

`FLD nn:ddd` ..... If the value of a fault flag or the contents of any associated fault log data changes, the fault flag record (above) and all the associated fault log data bytes are recorded in the rolling log. Each fault log data byte is displayed in either decimal or binary depending on which is the most appropriate. Alternatively, the data of some faults is displayed in a much more user-friendly form, as shown below:

`FLD nn:bbbbbbbb`

`CORR FLF 3:255` ..... See page 39 for the complete description of 'FLF 3'.
`A/RED STKON` ..... Phase 'A' 'Red' detected on when requested off.
`A/AMB NOTON` ..... Phase 'A' 'Amber' not detected on when requested.
`A/GRN CH1/2` ..... Phase 'A' 'Green' detected half-cycling.
`(ALL OFF)` ..... All signals appear off.
`A-D NOTON` ..... None of aspects on phases 'A' to 'D' appear on.
`PLUS OTHERS` ..... Displayed if more faults than those listed were detected.

`CFT FLF 5:255` ..... See page 43 for the complete description of 'FLF 5'.
`A+C+F+G+H` ..... List of conflicting phases that were requested to appear.

`DFM Lnn XXXXX` ..... See page 47 for the complete description of DFM faults.
`DFM L16 AC30M` ..... I/O Line 16 detected permanently active for 30 minutes.
`DFM L17 IN8H` ..... I/O Line 17 detected permanently inactive for 8 hours.
`DFM L17 CHNGD` ..... I/O Line 17 changed state after being reported faulty.
`DFM L17 CLEAR` ..... The DFM fault on I/O Line 17 has been cleared.
`DFM L18 KERBF` ..... I/O Line 18 has failed the kerbside test procedure.
`DFM L18 KERBP` ..... I/O Line 18 subsequently passed the kerbside test.
`DFM L18 KERBC` ..... The kerbside test fault on I/O Line 18 has been cleared.

`RLM FLF 22:3` ..... See page 53 for the complete description of 'FLF 22'.
`A/RLM1 SET` ..... First red lamp fault on phase 'A' confirmed.
`A/RLM2 SET` ..... Second red lamp fault on phase 'A' confirmed.
`A/RLM2 CLR` ..... Second red lamp fault on phase 'A' cleared.
`A/RLM1 CLR` ..... First red lamp fault on phase 'A' cleared.
`A/RLM CLR` ..... First and second red lamp fault on phase 'A' cleared.

LAMP FLF 55:255....	See page 64 for the complete description of ‘FLF 55’.
A/Amber 49W.....	Phase ‘A’ ‘Amber’ has lost 49W of load, e.g. one lamp has failed.
A/Amber 0W.....	Phase ‘A’ ‘Amber’ is now missing 0W of load; the fault has been cleared, e.g. the failed lamp has been replaced.
A/Amber+49W.....	Phase ‘A’ ‘Amber’ has unexpectedly gained 49W of load.
S33/A1 20W.....	Sensor ‘33’, aspect pattern ‘1’, has lost 20W of load. Section 9.2 covers sensor and aspect pattern numbers.
229-231V(230)	Shows the minimum, maximum and average lamp supply voltage seen by the software (for diagnostic purposes).
UTCF FLF 60:255....	See page 66 for the complete description of ‘FLF 60’.
UTC F3 AC200S	These events record which UTC Force Bit was stuck active and for approximately how long. NB: 'F3' (in the example) represents the UTC Force Bit that forces stage 3, which may be given a different identifier on the UTC I/O interface.

4.4.4 Historic Rolling Log – Miscellaneous Entries

DOOR OPEN..... DOOR CLOSED	These events are logged when either the manual panel or main cabinet door is opened. See IC4 help on the special conditioning mnemonic ‘DOORSW1’ for more information.
END OF LOG.....	This point marks the end of the rolling log. Press ‘+’ to view the log starting at the newest entry or press ‘-’ to view the log starting at the oldest entry still residing in the log. Press ‘Space’ to jump to the end of the rolling log.
ENTRY DELETED	The old entry that was being displayed has just been deleted in order to make room for a new entry that has just been added in to the rolling log. Press ‘+’ to view the newest entry or press ‘-’ to view the oldest entry still residing in the log.
LOG CORRUPT?	This marks the point in the log after which (if using the ‘+’ key) the contents of the log may be corrupt. If on power-up the firmware detects a corruption in the log, will insert this event to act as a warning, rather than erase the log.
{TT:AABBCC}	If the contents of a record in the rolling log are not recognised by the firmware, e.g. because they are corrupt, the type (TT) and the 3 data bytes (AA, BB and CC) of the record are displayed in hexadecimal (for engineering use only).
EMPTY RECORD(S).....	If the rolling log has become corrupt, it may contain a number of empty records. This is displayed when one or more empty records are reached in the rolling log. Press ‘+’ or ‘-’ to continue viewing the rolling log.

4.5 Fault Log Data Cross-Reference

The table below shows the fault log flags that include additional fault data, and is sorted in order of the fault log data allowing the associated fault flag to be found. All the fault flags of the controller are described in detail on the following pages…

Fault Log Data	Description	Fault Log Flag
FLD 0 to FLD 2	Not Currently Used	
FLD 3	Relay Tests Failed	FLF 4 RLAY
FLD 4	Watchdog Tripped	FLF 8 WDOG
FLD 5	Memory Fault	FLF 11 MEM
FLD 6	SDE/SA Board Operating Failure	FLF 20 SDEF
FLD 7 to FLD 9	Configuration / Firmware Not Compatible	FLF 21 CPAT
FLD 10 to FLD 12	Phase Bus Processor Checks Fail	FLF 2 PBUS
FLD 13	LSLS Power Failure	FLF 9 LSPF
FLD 14	LSLS Lamp Supply Failure	FLF 17 LSUP
FLD 15	LSLS Major Internal Fault	FLF 42 LSMF
FLD 16 to FLD 17	Limit Green Watchdog	FLF 25 LGRN
FLD 18	Special Conditioning – General Fault 1	FLF 27 SCF1
FLD 19	Special Conditioning – General Fault 2	FLF 28 SCF2
FLD 20 to FLD 31	No Longer Used (previously used by FLF12)	(FLF 12 DFM)
FLD 32	Priority DFM Failure	FLF 18 PDFM
FLD 33 to FLD 49	Not Currently Used	
FLD 50 to FLD 65	Conflict Detected	FLF 5 CFT
FLD 66 to FLD 71	Not Currently Used	
FLD 72 to FLD 73	Audio/Tactile Signal Check, Stuck Closed	FLF 45 AUDC
FLD 74 to FLD 75	Audio/Tactile Signal Check, Stuck Open	FLF 46 AUDF
FLD 76 to FLD 77	CPU Crystal Frequency Wrong	FLF 48 FREQ
FLD 78 to FLD 79	Expansion I/O Card Missing or Wrong Type	FLF 13 IOB
FLD 80	Stand-alone Pedestrian Stream Link Fail	FLF 53 LINK
FLD 81	Integral TC12-OTU Fault	FLF 58 ANCL
FLD 82	Integral OMU (IMU) Fault	FLF 59 IMU
FLD 83 to FLD 90	Red Lamp Fault	FLF 22 RLM
FLD 91	PHS / LSLS Card Missing	FLF 43 LSLS
FLD 92 to FLD 127	Correspondence Failure	FLF 3 CORR
FLD 128 to FLD 129	Not Currently Used	
FLD 130 to FLD 153	Faulty LSLS Output	FLF 33 LOUT
FLD 154 to FLD 249	Not Currently Used	

4.6 Description of the Fault Log Flags

The table starting over the page describes the meaning of each of the fault flags.

In the ‘Flag’ column is the Fault Flag’s indentifying number. Under this number is an indication as to whether the fault causes the controller to shutdown and whether manual invention is required. These indications are explained below.

SHUTDOWN	The fault always causes the controller to shutdown to signals off or hardware fail flash. Manual Reset is always required; typically using the handset command RFL and switching the power to the controller OFF and ON (see section 4.3).
SIGNALS OFF	The fault causes the signals to be extinguished. These faults are typically logged while there appear to be problems with the incoming mains supply to the controller, such as voltage too low. When the fault is cleared, the signals will restart through the Start-Up Sequence.
SIGNALS OFF / FLASH	As for ‘Signals Off’, except the signals will flash if the lamp supply is present but below a configured threshold and ‘Fail to Part-Time’ is configured to flash the signals.
SIGNALS REMAIN ON	This fault does not extinguish the signals by default, although it can (if required) be configured to switch the signals off or shutdown.
MANUAL RESET	Manual Reset is required to clear the Fault Log Flag, typically using the RFL handset command (see section 4.3). May require switching the power to the controller OFF and ON if the check is only performed on power-up.
AUTOMATIC RESET	The Fault Log Flag is automatically cleared when the controller confirms that the fault condition has ceased. The handset command RFL may have no effect on the Fault Log Flag.
⋆ ⋆ ⋆	Refer to the text in the Description of the Fault Flag for details.

Flag	Description
0	**FLF 0 – Not Currently Used**
1	**FLF 1 – Not Currently Used**
2	**FLF 2 – Phase Bus Processor Checks Fail**

SHUTDOWN

PBUS FLF 2:N, FLD 10:X, FLD 11:Y, FLD 12:Z

The controller will switch off the signals and log a fault if a fault is detected by (or with) the phase bus processor.

The values 1 to 9 are used to identify failed integrity checks and should only be generated by faults on the main processor card, therefore try replacing it.

- FLF 2:1 – Phase Bus Processor RAM fault
- FLF 2:2 – Phase Bus Processor Firmware PROM checksum fault
- FLF 2:3 – Incompatible configuration
- FLF 2:4 – Phase Bus Processor configuration checksum fault
- FLF 2:5 – Message time-out (main processor temporarily stopped)
- FLF 2:6 – Unknown message from main processor
- FLF 2:7 – Phase Bus Processor internal software fault
- FLF 2:8 – Phase Bus Processor Hardware Incompatible
- FLF 2:9 – Controller / Phase Bus Processor Incompatible

The values 10 to 19 are used to identify failed hardware integrity checks and should only be generated by faults on the lamp switch cards or the ribbon cable to the cards.

- FLF 2:10 – Lamp switch card fault, e.g. not enough cards fitted
  - FLD 10 – 1 = Data latch test failed
  - FLD 11 – 1 = Addressing test failed
  - FLD 12 – 1 = ADC tests failed

The fault FLF 2:10, FLD 10:0, FLD 11:0, FLD 12:1 will be logged if the variant of the Lamp Switch Card does not match the KLV setting (page 123). For other faults, try replacing each card in turn. Also consider using the 'Self-Test' facility that will test any number of cards fitted (see the Installation, Commissioning and Maintenance Handbook for details on the Self-Test)

- FLF 2:13 – Unexpected red current fault, i.e. current detected by the smaller 'last red' current transformer (not fitted in most controllers) while the red aspect was off.

FLF 2 continues overleaf…

Flag	Description

2 (CONT.) **FLF 2 – Phase Bus Processor Checks Fail (continued)**

The values 20 to 29 are used by the secondary safety checking facilities provided by the phase bus processor. Normally the main processor should detect, confirm and report the following types of faults before the phase bus processor so these faults should never appear. If one of these faults were logged, it would imply that the main processor has missed the fault, possibly due to a configuration error.

- `FLF 2:20` – Correspondence fault (see FLF 3 if Fail to Part-Time is configured)
- `FLF 2:21` – Half cycle correspondence fault
- `FLF 2:22` – Conflict fault (e.g. phases with intergreen both at green)
- `FLF 2:23` – Any green fault (not currently used)
- `FLF 2:24` – Last red fault
- `FLF 2:25` – ZXO missed fault
- `FLF 2:26` – Audible/Tactile fault (e.g. conflicting phases not at red)

The following fault is always reported by the phase bus processor when it is instructed to shut down when the main processor finds a serious fault, but not recorded in the fault log. If it does appear in fault log, it would imply a fault with the main processor card.

- `FLF 2:30` – Shutdown message from main processor

The following fault is generated by the phase bus processor if communications from the main processor cease, but the main processor is still requesting Relay B is switched ON. It implies a failure of the main processor card.

- `FLF 2:31` - No requests but Relay B On

Fault log values of 200 or above are generated by the main processor when it detects a problem with either the PHP or PHS Phase Bus Processor and would normally point to a problem on the main processor card. Similar faults may be detected on start-up and result in a text error message being output on the handset rather than a fault log entry; those are detailed in section 2.3.

- `FLF 2:200` – PHP Dual port RAM memory fault
- `FLF 2:251` – PHS Phase Bus firmware is incompatible
- `FLF 2:252` – Monitor Validation tests failed *
- `FLF 2:253` – PHP Phase Bus firmware is incompatible **
- `FLF 2:254` – Comms with the PHP (LV) or PHS (ELV) have ceased
- `FLF 2:255` – PHP Phase Bus Processor not detected on power-up

* The monitor validation system verifies the operation of the phase bus processor by inverting a selection of the voltage monitor signals on the lamp switch cards, therefore a failure of this test may be due to a faulty main processor card or one of the lamp switch cards or the inter-connecting cables. On an ST900ELV Controller with more than one LSLS Card, the fault may also be caused by a faulty lamp supply transformer (AC logic power to one LSLS card may be reversed causing its ZXO to be out of phase).

** The SIC handset command shows the PHP firmware version. Check the document 667/SU/32900/000 for the latest compatibility information. For example, from PB801 issue 7 onwards, the controller insists that PB815 issue 4 (or later) is fitted.

Flag	Description

3 FLF 3 – Correspondence Failure

SHUTDOWN (Typically)

CORR FLF 3:255, E/GRN CH1/2

The main processor has detected a mismatch between the requested and actual states of the signals on the street. May also be referred to as an 'Equivalence' or 'Compliance' fault.

The Self-Test facility may be able to cast more light on the problem.

Typically such faults will be configured to shutdown the traffic controller and the signals will switch off (or hardware fail flash), but other configuration options are available.

If 'Fail to Part-Time' is not configured, the operation is as follows:

The controller will always shutdown when a fault with a green output is confirmed.

Faults with red, amber and switched sign outputs can be configured to do the same or just log a fault (see ENG 228). In the latter case, RFL=1 will always clear the fault from the log, but the fault will be re-reported if it is detected again by the controller.

If 'Fail to Part-Time' is configured, the operation is as follows:

The stream will immediately move to its part-time state when a fault with a green output is confirmed.

Faults with red, amber and switched sign outputs can be configured to do the same or just log a fault.

While in this part-time failure state, a fault confirmed with a green output will always cause shutdown, whereas faults with red and amber outputs can be configured to shutdown or just log a fault.

Correspondence Faults confirmed while already in the part-time failure state may be confirmed by the Phase Bus Processor and FLF 2:20 logged for example, rather than FLF 3.

Continued overleaf…

Flag	Description

3 (CONT.) **FLF 3 – Correspondence Failure (continued)**

Rolling Log (LOG)

The rolling log will always attempt to summarise the fault, rather than displaying all 36 bytes of fault log data (see overleaf). The following messages may therefore appear in the rolling log:

`CORR FLF 3:255, (ALL OFF)`
None of the signals are illuminated, check the lamp supply connections.

`CORR FLF 3:255, E-H NOTON`
The given group of four phases was not illuminated; check the lamp supply fuses as each fuse protects four phases (except fail flashing and ELV controllers).

`CORR FLF 3:255, A/RED STKON`
The output for the given phase and colour is ‘stuck on’, i.e. the solid-state switch for the output has not switched OFF, the voltage monitors for that output are faulty, or there is a ‘short-circuit’ in the street cabling between this and another output that is ON.

`CORR FLF 3:255, B/AMB NOTON`
The output for the given phase and colour is ‘not on’, i.e. the solid-state switch for the output has not switched ON, the voltage monitors for that output are faulty, or the lamp supply to that output has failed.

`CORR FLF 3:255, C/GRN CH1/2`
The output for the given phase and colour is half-cycling, i.e. is ON for one half cycle but not the other because the output switch itself is half-cycling, or one of the voltage monitor channels for that output is faulty.

`CORR FLF 3:255, … PLUS OTHERS`
The LOG will list up to eight individual correspondence fault entries, but if more than eight individual faults have been detected, ‘`PLUS OTHERS`’ will be displayed after the last.

Continued overleaf…

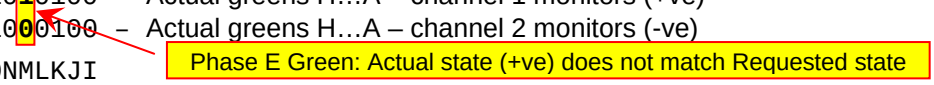
Flag	Description

3 (CONT.) **FLF 3 – Correspondence Failure (continued)**

Fault Data (FLD)

The fault log data bytes FLD 92 to FLD 127 detail the requested states of all the signals and the actual states detected by the voltage monitors. One binary bit per phase, where '1' indicates requested or detected 'ON'. For example, if phase E green is half cycling, the fault data would show:

```
          HGFEDCBA
FLD  92:00111001 – Requested reds Phases H…A, e.g. Phases A,D,E,F at Red
FLD  93:00111001 – Actual reds H…A – channel 1 monitors (+ve)
FLD  94:00111001 – Actual reds H…A – channel 2 monitors (-ve)
FLD  95:00100010 – Requested ambers Phases H…A, e.g. Phase B & F Ambers ON
FLD  96:00100010 – Actual ambers H…A – channel 1 monitors (+ve)
FLD  97:00100010 – Actual ambers H…A – channel 2 monitors (-ve)
FLD  98:11000100 – Requested greens Phases H…A, e.g. Phases C,G,H at Green
FLD  99:11010100 – Actual greens H…A – channel 1 monitors (+ve)
FLD 100:11000100 – Actual greens H…A – channel 2 monitors (-ve)
          PONMLKJI
FLD 101:XXXXXXXX – Requested reds Phases P…I
FLD 102:XXXXXXXX – Actual reds P…I – channel 1 monitors (+ve)
FLD 103:XXXXXXXX – Actual reds P…I – channel 2 monitors (-ve)
FLD 104:XXXXXXXX – Requested ambers Phases P…I
FLD 105:XXXXXXXX – Actual ambers P…I – channel 1 monitors (+ve)
FLD 106:XXXXXXXX – Actual ambers P…I – channel 2 monitors (-ve)
FLD 107:XXXXXXXX – Requested greens Phases P…I
FLD 108:XXXXXXXX – Actual greens P…I – channel 1 monitors (+ve)
FLD 109:XXXXXXXX – Actual greens P…I – channel 2 monitors (-ve)
          XWVUTSRQ
FLD 110:XXXXXXXX – Requested reds Phases X…Q
FLD 111:XXXXXXXX – Actual reds X…Q – channel 1 monitors (+ve)
FLD 112:XXXXXXXX – Actual reds X…Q – channel 2 monitors (-ve)
FLD 113:XXXXXXXX – Requested ambers Phases X…Q
FLD 114:XXXXXXXX – Actual ambers X…Q – channel 1 monitors (+ve)
FLD 115:XXXXXXXX – Actual ambers X…Q – channel 2 monitors (-ve)
FLD 116:XXXXXXXX – Requested greens Phases X…Q
FLD 117:XXXXXXXX – Actual greens X…Q – channel 1 monitors (+ve)
FLD 118:XXXXXXXX – Actual greens X…Q – channel 2 monitors (-ve)
          FEDCBAZY
FLD 119:XXXXXXXX – Requested reds Phases F2…Y
FLD 120:XXXXXXXX – Actual reds F2…Y – channel 1 monitors (+ve)
FLD 121:XXXXXXXX – Actual reds F2…Y – channel 2 monitors (-ve)
FLD 122:XXXXXXXX – Requested ambers Phases F2…Y
FLD 123:XXXXXXXX – Actual ambers F2…Y – channel 1 monitors (+ve)
FLD 124:XXXXXXXX – Actual ambers F2…Y – channel 2 monitors (-ve)
FLD 125:XXXXXXXX – Requested greens Phases F2…Y
FLD 126:XXXXXXXX – Actual greens F2…Y – channel 1 monitors (+ve)
FLD 127:XXXXXXXX – Actual greens F2…Y – channel 2 monitors (-ve)
```



Flag	Description

4 FLF 4 – Relay Tests Failed

SHUTDOWN

RLAY FLF 4:255, FLD 3:XXXXXXXX

The relay tests try to detect lamp supply relay faults while the controller is operating normally with the lamp supply ON. By opening just the relay under test, the lamp supply should still switch off unless that relay or its drive circuits are faulty. If the lamp supply is not switched off, this fault is raised. Note: If any relay is stuck open circuit, the lamp supply fault (FLF17 page 49) will detect no lamp supply.

The fault log data will indicate the faulty relay:

FLD 3:00000001 – Relay A appears to be stuck short circuit
FLD 3:00000010 – Relay B appears to be stuck short circuit
FLD 3:00000100 – SSR appears to be stuck short circuit *
FLD 3:00001000 – Hardware Fail Flash fault **

* May be reported if no lamps are connected to the controller

** Check the HFF setup of the controller. Reported on an ST900 ELV Controller if:

- HFF is configured, but only 1 LSLS card is fitted
- HFF is configured, but LSLS #1 has been switched off by Relay A test
- HFF is not configured, but LSLS #1 not switched off by Relay A.

Flag	Description

5 FLF 5 –Conflict Detected

SHUTDOWN

CFT FLF 5:255, C+G

The main processor has extinguished the signals because it was about to illuminate conflicting aspects of the given phases, phase C and G in this example, which have been configured as conflicting, i.e. there is a fault in the configuration. This check includes green/amber conflicts as well as green/green conflicts.

The first 4 bytes of fault data show the conflicting phases:
FLD 50:01000100 – Conflicting phases H…A
FLD 51:00000000 – Conflicting phases P…I
FLD 52:00000000 – Conflicting phases X…Q
FLD 53:00000000 – Conflicting phases F2…Y

The next 12 fault data bytes show the requested lamp states:
FLD 54:00111001 – Requested reds H…A
FLD 55:00100010 – Requested ambers H…A
FLD 56:11000100 – Requested greens H…A
FLD 57:11100000 – Requested reds P…I
FLD 58:00000000 – Requested ambers P…I
FLD 59:00000000 – Requested greens P…I
FLD 60:00000000 – Requested reds X…Q
FLD 61:00000000 – Requested ambers X…Q
FLD 62:00000000 – Requested greens X…Q
FLD 63:00000000 – Requested reds F2…Y
FLD 64:00000000 – Requested ambers F2…Y
FLD 65:00000000 – Requested greens F2…Y

---

6 FLF 6 – No ZXO detected

SIGNALS OFF
AUTOMATIC RESET

NZXO FLF 6:255

The controller cannot synchronise to the mains' zero cross over signal and thus has extinguished all the signals.

Check the connections from the back of the power distribution unit to the back of the first lamp switch card (ST900 Mains Controller only) and check that the first lamp switch card is connected to the main processor card (all controller types).

This fault will be automatically cleared when the controller has successfully synchronised to the mains.

Flag	Description

7 FLF 7 – Real Time Clock Needs Setting

SIGNALS REMAIN ON MANUAL RESET

`RTC FLF 7:255`

This flag is set when:

- the controller is first powered up to indicate that the real time clock needs setting to the correct time,
- the RAM battery support is detected as faulty on power-up, see FLF 50, since this also supports the real time clock device on the main processor card,
- the contents of the real time clock device appear to be corrupt, or
- the controller has been without mains power for longer than the configured power fail time, see PFT.

Use the handset command TOD to set the clock. See section 7.1 starting on page 87 for more information on setting the clock.

Note that the controller will always attempt to keep the real time clock running for the historic rolling log rather than resetting back to the default time of '`01-JAN-90 00:00:00`' when this fault is detected.

---

8 FLF 8 – Watchdog Tripped

SHUTDOWN

`WDOG FLF 8:255, FLD 4:XXXXXXXX`

The watchdog systems on the controller have detected a fault:

`FLD 4:00000001` – Hardware watchdog timed-out
`FLD 4:00000010` – TWD command entered on handset
`FLD 4:00000100` – 20ms execution count incorrect
`FLD 4:00001000` – 200ms execution count incorrect
`FLD 4:00010000` – ZXO/peak execution count incorrect
`FLD 4:00100000` – Main Processor clock frequency fault
`FLD 4:01000000` – Free time is too low; see the FRE command
`FLD 4:10000000` – 200ms routines have stopped

`FLD 4:X-XXXX-X` - Treat these faults as a faulty main processor card.

Flag	Description

9 FLF 9 – LSLS Power Failure

SIGNALS OFF
AUTOMATIC RESET

`LSPF FLF 9:255, FLD 13:XXXXXXXX`

Records which LSLS cards appear to power down during a Mains Break or Brownout or are not detected on power-up. Automatically cleared when the card returns to normal operation.

The fault is not logged during 'normal' mains breaks. If the fault is logged, check whether mains supply is very low or whether LSLS card is faulty.

`FLD 13:00000001` – LSLS 1 missing or faulty
`FLD 13:00000010` – LSLS 2 missing or faulty
…through to…
`FLD 13:00100000` – LSLS 6 missing or faulty

Check the Status LEDs on all the LSLS Cards (see 667/HE/32900/000), e.g.

- LED-A Red continuous = Major Fault; LSLS Card has failed.
- LED-A & LED-B yellow continuous = low logic power (held reset).
- LED-A OFF, LED-B flashing = Normal operation or awaiting start.

If either of the top two bits are set, one or more of the lamp switch cards have reported problems with ZXO (typically due to repetitive mains interruptions) or low power, for example:

`FLD 13:01000001` – LSLS 1 has reported no ZXO
`FLD 13:10000001` – LSLS 1 has reported low power

10 FLF 10 – Not Currently Used

Flag	Description

11 FLF 11 – Memory Fault

(★★★) SHUTDOWN

`MEM FLF 11:255, FLD 5:XXXXXXXX`

The controller has detected a memory fault. The fault data indicates the failed area(s):

`FLD 5:00000001` – Program PROM checksum failure

A full check of the program PROM is always performed on every power-up and a fault would normally result in the message being repeatedly output on the handset, see page 12. The above fault is raised by the background check of the program PROM and thus would imply an intermittent fault with the program PROM or the main processor card.

`FLD 5:00000010` – Configuration PROM failure

★★★ This fault will not normally extinguish the signals. It is raised when the configuration PROM checksum is incorrect. This fault will be raised and **will** always extinguish the signals whenever the controller needs to load configuration data but no PROM is fitted, e.g. on first time power-up or following a corruption of the configuration data held in RAM.

This fault will not be raised if the configuration data has been loaded directly through the handset using IC4 since the controller insists that the configuration PROM is removed.

This fault will not be raised if the 'NoProm' IC4 option is specified because this option allows the configuration PROM to be removed once the controller is running normally. This option is usually enabled by selecting the default data file 'NoProm.8DF' on the IC4 Modes and Facilities screen and is enabled in the standard stand-alone ped configurations for example.

The controller may treat a faulty PROM as if no PROM fitted is fitted because it is not always possible to distinguish between the two conditions. Therefore, the controller may not log a fault or extinguish the signals when a new configuration PROM is fitted and that PROM is faulty (although see FLF 61 on page 67). After attempting to load a new configuration, always check the CIC and CRC values match the IC4 printout to ensure that the correct PROM has been inserted and the correct configuration has been loaded in to the controller.

`FLD 5:00000100` – RAM read/write test failure
`FLD 5:00001000` – RAM junction data corrupt
`FLD 5:00010000` – RAM timings data corrupt
`FLD 5:00100000` – RAM rolling log and date/time store corrupt

These RAM faults may be generated on first time power-up since the RAM is empty. Corruptions reported on other power-ups point to a problem with the RAM battery support (see FLF 50) while corruptions during normal operation point to problems with the main processor card.

`FLD 5:01000000` – Configuration image loaded into RAM is corrupt

The configuration image fault is only generated if the configuration loaded directly through the handset port into RAM, using IC4, was corrupt. This fault can be cleared by RFL=1 and is only raised to act as a warning that the configuration load failed.

Flag	Description

12 FLF 12 – DFM Failure

SIGNALS REMAIN ON MANUAL RESET

`DFM L95 IN12H`

Detector fault monitor failure, i.e. the given I/O line has been stuck active or inactive for longer than the configured time.

The handset command ‘DSF’ identifies the faulty I/O lines, see page 82. The fault also appears in the rolling log; see section 4.4 on page 31.

When RFL=1 is entered to clear the fault log, it will automatically initiate a kerbside test. If the kerbside detector passes this test, the FLF entry is cleared and a ‘DFM L11 KERBC’ entry is placed in the rolling log.

---

13 FLF 13 –I/O Card Missing or Wrong Type

SIGNALS REMAIN ON AUTOMATIC RESET

`IOB FLF 13:255, FLD 78:XXXXXXXX, FLD 79:XXXXXXXX`

The controller is not able to detect all the I/O cards that are required by this configuration and so has logged this fault. Also see the command ‘IOB’.

The fault will be automatically cleared when the card is detected. While a card is faulty, all inputs from the card will appear open-circuit, except those configured to be forced active/inactive on a DFM failure (see DFA on page 82).

`FLD 79:00000010` – I/O Card address 1 has failed or is the wrong type
…through to…
`FLD 79:10000000` – I/O Card address 7 has failed or is the wrong type
…and…
`FLD 78:00000001` – I/O Card address 8 has failed or is the wrong type
…through to…
`FLD 78:10000000` – I/O Card address 15 has failed or is the wrong type

If the communications LED on the I/O card is still flashing, it is likely that the card type does not match that required by the configuration. Check the IC4 printout.

---

14 FLF 14 – On-Street Configuration Mode Active

SHUTDOWN

`CFGM FLF 14:255`

The on-street configuration facility allows the engineer on the street to alter configuration items that would normally be fixed in the configuration PROM in order to configure simple junctions using only the handset.

This facility is not available in the UK. See section 10 starting on page 128 for more information.

Flag	Description

15 FLF 15 – Configuration PROM Changed

SHUTDOWN

```
DIFC FLF 15:255
```

On power-up, the controller has detected that the configuration PROM fitted is different to that used previously to initialise the controller and thus has logged this fault and not illuminated the signals.

If a new configuration PROM has just been inserted, use the initialisation commands (TKE, CNN and LRN – see page 69) to load the new configuration data into the controller's RAM.

NOTE: The fault FLF 15 will not be raised if the checksum on the new PROM is faulty; see FLF 11:255 / FLD 5:00000010 on page 46.

The fault FLF15 may also be logged if the old configuration PROM is left in the socket when a new configuration is loaded through the handset port directly from IC4. In this case:

1. Enter the command RFL=1
2. Switch the controller's power OFF
3. Remove the old configuration PROM, and
4. Switch the controller back ON.

16 FLF 16 – Program PROM changed

SHUTDOWN

```
NEWF FLF 16:255
```

On power-up, the controller has detected that the program (or 'firmware') PROM has been changed and so the configuration PROM has been re-loaded into RAM and the lamps remain off until RFL=1 has been entered.

May also be raised if the RAM contents are corrupt, e.g. on first time power-up or after a long mains break.

Flag	Description

17 FLF 17 – Lamp Supply Failure

SIGNALS OFF / FLASH
AUTOMATIC RESET

LSUP FLF 17:255, FLD 14:X0XXXXX

While the supply is confirmed as faulty (see below), the controller will extinguish all the traffic signals. RFL=1 has no effect on this fault. The fault will be automatically cleared when the supply is restored and the traffic signals will illuminate using the defined start-up sequence.

If the traffic signal sequence has been restarted due to short dips in the lamp supply, due to short mains supply brownouts for example, time-stamped FLF 17 fault occurrence and clearance events will be recorded in the historic rolling log. Alternatively, if the mains supply voltage falls very low, POWER OFF/POWER ON events will be logged instead.

Important

If the signals are switched off after this fault has been raised (using the manual panel signals on/off switch for example), the fault will not be cleared until the signals are switched back on and the controller can confirm that the lamp supply has been restored.
Also check that FLF17 is not marked as an 'Act Flag' on the IC4 page "Fault Log Flags" because this will prevent the controller from switching on the supply and checking that the voltage has recovered.

LV Controllers

The lamp supply has dropped below the configurable thresholds LBT/LDT (see page 73), e.g. low incoming mains supply voltage or ruptured fuse. On these controllers, FLD 14 is not used.

ELV Controllers

The lamp supply on one or more LSLS cards is outside the required voltage bands, or is simply not present (e.g. fuse blown). The fault data identifies the LSLS cards on which the fault has been found, e.g. FLD 14:00000001 for LSLS #1 and FLD 14:00111111 for all 6. If the top bit is also set (e.g. FLD 14:10XXXXX), the lamp supply is too high.

Check the fuses on the HPU if all the cards from that HPU are marked as faulty.

If all cards are faulty, check the lamp supply reading, using the 'KEV' handset command (see page 73). If the reading appears significantly different from the nominal supplies 48V (bright) or 27.5V (dim), carefully measure the incoming mains supply to the controller and consider changing the 'tap' on the lamp supply transformer if the measured voltage does not match the 'tap' used. For example, if the lamp supply (KEV) appears high and the mains voltage is also high, e.g. between 240V and 250V, but the mains input is connected to the 230V tap on the transformer, consider moving the mains input to the 240V tap.

Flag	Description

18 **FLF 18 – Priority DFM Failure**

SIGNALS REMAIN ON MAN / AUTO RESET

PDFM FLF 18:255, FLD 32:XXXXXXXX

The controller has detected a DFM fault on the (bus) priority unit(s) identified in the fault log data.

This fault can be configured to automatically clear from the fault log using the 'auto-reset' option, see the PDR command.

---

19 **FLF 19 – SDE/SA Card Failure**

SIGNALS REMAIN ON MANUAL RESET

SDEP FLF 19:255

On power-up, the controller has not been able to detect the SDE/SA card that is required by this configuration.

---

20 **FLF 20 – SDE/SA Card Operating Failure**

SIGNALS REMAIN ON MANUAL RESET

SDEF FLF 20:255, FLD 6:XXXXXXXX

The SDE/SA card has detected an internal fault and shutdown.

FLD 6:00000001 – Background PROM check failed
FLD 6:00000010 – Shared RAM read/write check failed
FLD 6:00000100 – Working RAM tests failed
FLD 6:00001000 – Configuration data (from the controller) faulty
FLD 6:00010000 – Background checks not completed in time.

Flag	Description

21 FLF 21 – Configuration and Controller are Not Compatible

SHUTDOWN

`CPAT FLF 21:255, FLD 7:N, FLD 8:X, FLD 9:Y`

If the configuration data and the controller are not compatible, this fault will be set and the signals will be extinguished.

Many of these compatibility faults are usually caused by the configuration data requiring a later issue of firmware than is fitted. Check that the firmware fitted is the same or a later issue than that specified in the 'Controller And Firmware Type' field on the Administration page of the IC4 printout, and shown by the 'CIE' handset command (see page 72).

FLD 7 identifies the source of the incompatibility, with additional information held in FLD 8 and FLD 9.

`FLD 7:1` – Compatibility Number
`FLD 8:X` – Firmware PROM Compatibility Number
`FLD 9:Y` – Configuration PROM Compatibility Number

`FLD 7:2` – Unknown Facility Requested In The Facilities Table
`FLD 8:X` – Facility Number
`FLD 9:Y` – Value See 'FAC' on page 71

`FLD 7:3` – Unknown Configuration Item
`FLD 8:X` – Item Identity Given By X + Y x 256
`FLD 9:Y /` (for engineering use only)

`FLD 7:4` – Invalid Configuration Data
`FLD 8:X` – Item Identity Given By X + Y x 256
`FLD 9:Y /` (for engineering use only)

`FLD 7:5` – Invalid Lamp Sequence Command
`FLD 8:X` – Phase (where zero represents phase A)
`FLD 9:Y` – Command

`FLD 7:6` – Invalid Conditioning Command
`FLD 8:X` – Command Code (for engineering use only)

`FLD 7:7` – Conditioning Timer Out of Range
`FLD 8:X` – Timer Number Given By X + Y x 256
`FLD 9:Y /` (for engineering use only)

`FLD 7:8` – Attempted Access Outside Conditioning Array
`FLD 8:X` – Offset Given By X + Y x 256
`FLD 9:Y /` (for engineering use only)

Continued overleaf…

Flag	Description

21 (Cont) **FLF 21 – Configuration / Firmware Not Compatible (Continued)**

FLD 7:9 – Invalid Controller Base Time Date Parameters
FLD 8:X – Day (Only 1st January supported initially)
FLD 9:Y – Month

FLD 7:10 - Requested facility is disabled by the EPLD.
FLD 8:XXX – PLD variant as shown by the command 'PLD'
8:0 – Variant /000, or
8:101 – Variant /101 for example.
FLD 9:Y – Error code, where…
9:0 – Unrecognised PLD variant.
9:1 – Lamp monitoring not permitted.
9:2 – Integral SDE/SA not permitted.
9:3 – Only stand-alone pedestrian streams permitted.

The required feature (as indicated by FLD 9) is not permitted on this version of the controller. The handset command 'PLD' (page 73) lists the types (variants) of EPLD.

FLD 7:11 - Conditioning attempted access outside extended fetch array
FLD 8:X – Offset given by X + Y x 256
FLD 9:Y / (for engineering use only)

FLD 7:12 – Feature is not permitted.
FLD 8:X – Hardware Code (for engineering use only)
FLD 9:Y – Error code as for FLF 7:10 (EPLD) above.

The required feature is not permitted on this version of the ST750ELV controller. For example, 'FLD 9:3' will be logged if the configuration contains an intersection stream and the controller is an ST750ELV stand-alone pedestrian controller.

FLD 7:99 - Configuration requires a later version of controller firmware.
FLD 8:0 – Not used
FLD 9:0 – Not used

If the fault FLD 7:99 is logged, then the configuration requires a later version of controller firmware. The version of firmware required by the configuration is shown in the CIE handset command (see page 72). The new configuration has not been loaded into memory. The old configuration should still be present in memory. Use RFL=1 to clear this fault and return the controller to normal working (with the old configuration) or fit the correct firmware PROM.

Flag	Description

22 FLF 22 – Red Lamp Fault

★★★ LAMP FLF 55:255, A/Red 49W, RLM FLF 22:1, A/RLM1 SET

The lamp monitor has detected a red lamp fault (also see FLF 55) which affects the controller's operation, i.e. Red Lamp Monitoring is configured.

FLF 22:1 – 1st red lamp fault confirmed.
FLF 22:3 – 2nd red lamp fault confirmed.

★★★ The actions and reset options are configurable:

In the UK, a second red lamp fault on a vehicle phase is typically configured to inhibit the conflicting pedestrian phase(s), except on a Part Time stream or stand-alone pedestrian stream where the fault is configured to extinguish all the signals. Outside the UK, second red lamp faults can be configured to force the stream to its flashing part-time state.

A first red lamp fault, or a second red lamp fault that only inhibits the appearance of phases, can be configured for automatic or manual clearance. If red lamp faults extinguish or flash the stream, clearance of the fault always requires manual reset; refer to section 9.6.

In the historic rolling log, entries of the form listed below will follow the 'FLF 22' red lamp monitor fault flag entry, rather than the FLD fault data bytes. These entries identify whether a first (RLM1) or second (RLM2) red lamp fault has been confirmed (SET) or cleared (CLR) on that phase:

A/RLM1 SET – When a first red lamp fault occurs on the phase.

A/RLM2 SET – When a second red lamp fault occurs.

A/RLM2 CLR – When the second red lamp fault is cleared, but a first red lamp fault is still present on the phase.

A/RLM1 CLR – When the first red lamp fault on the phase is cleared.

A/RLM CLR – When both the first and second red lamp faults are cleared simultaneously, leaving no red lamps faults on that phase.

The fault log data indicates on which phases the red lamp failures have occurred:
FLD 83:00000001 – 1st red lamp fail on phase A
FLD 83:00000011 – 2nd red lamp fail on phase A
FLD 83:00000100 – 1st red lamp fail on phase B
FLD 83:00001100 – 2nd red lamp fail on phase B

This continues for the rest of the bits in FLD 83:
FLD 83:00XX0000 – 1st/2nd red fails on phase C
FLD 83:XX000000 – 1st/2nd red fails on phase D

Similarly, FLD 84-90 identify failures on the rest of the phases.

Continued overleaf…

Flag	Description

22 (Cont) **FLF 22 – Red Lamp Fault (Continued)**

Red Lamp Fault Log Data:

FLD 83:000000XX – 1st/2nd red fails on phase A
FLD 83:0000XX00 – 1st/2nd red fails on phase B
FLD 83:00XX0000 – 1st/2nd red fails on phase C
FLD 83:XX000000 – 1st/2nd red fails on phase D

FLD 84:000000XX – 1st/2nd red fails on phase E
FLD 84:0000XX00 – 1st/2nd red fails on phase F
FLD 84:00XX0000 – 1st/2nd red fails on phase G
FLD 84:XX000000 – 1st/2nd red fails on phase H

FLD 85:000000XX – 1st/2nd red fails on phase I
FLD 85:0000XX00 – 1st/2nd red fails on phase J
FLD 85:00XX0000 – 1st/2nd red fails on phase K
FLD 85:XX000000 – 1st/2nd red fails on phase L

FLD 86:000000XX – 1st/2nd red fails on phase M
FLD 86:0000XX00 – 1st/2nd red fails on phase N
FLD 86:00XX0000 – 1st/2nd red fails on phase O
FLD 86:XX000000 – 1st/2nd red fails on phase P

FLD 87:000000XX – 1st/2nd red fails on phase Q
FLD 87:0000XX00 – 1st/2nd red fails on phase R
FLD 87:00XX0000 – 1st/2nd red fails on phase S
FLD 87:XX000000 – 1st/2nd red fails on phase T

FLD 88:000000XX – 1st/2nd red fails on phase U
FLD 88:0000XX00 – 1st/2nd red fails on phase V
FLD 88:00XX0000 – 1st/2nd red fails on phase W
FLD 88:XX000000 – 1st/2nd red fails on phase X

FLD 89:000000XX – 1st/2nd red fails on phase Y
FLD 89:0000XX00 – 1st/2nd red fails on phase Z
FLD 89:00XX0000 – 1st/2nd red fails on phase A2
FLD 89:XX000000 – 1st/2nd red fails on phase B2

FLD 90:000000XX – 1st/2nd red fails on phase C2
FLD 90:0000XX00 – 1st/2nd red fails on phase D2
FLD 90:00XX0000 – 1st/2nd red fails on phase E2
FLD 90:XX000000 – 1st/2nd red fails on phase F2

In each case the two bits identified by ‘XX’ above indicate:
00 – No red lamp faults
01 – 1st red lamp fault confirmed on that phase
11 – 2nd red lamp fault confirmed on that phase

Flag	Description

23 FLF 23 – Pedestrian Controller Fault (Special Conditioning)

SIGNALS REMAIN ON MANUAL RESET

PED FLF 23:N

The controller, using special conditioning, has detected a fault with the pedestrian inhibit signal to a separate pedestrian controller.

FLF 23:1 – The inhibit signal was sent to the Pedestrian Controller, but no inhibit confirm signal was replied.

FLF 23:2 – The inhibit signal was lifted and a pedestrian demand was present, but after a delay time, the vehicle green confirm signal was not replied, or did not persist while the inhibit signal was active.

FLF 23:4 – The vehicle green confirm signal disappeared for longer than the delay time.

Two or more faults detected result in the sum of the 2 faults being logged, e.g. 'FLF 23:1' and 'FLF 23:2' would result in 'FLF 23:3'.

The delay time mentioned is equal to the sum of the intergreen to the pedestrian phase, the pedestrian phase green time and the intergreen back to the vehicle phase.

---

24 FLF 24 – LRT Fault (Special Conditioning)

SIGNALS REMAIN ON MANUAL RESET

LRT FLF 24:N

The controller, using special conditioning, has detected a fault with LRT (Light Rail Transit) Interrogator/Decoder.

FLF 24:1 – 1st Interrogator/Decoder Fault
FLF 24:2 – 2nd Interrogator/Decoder Fault.
FLF 24:3 – 1st and 2nd Interrogator/Decoder Faults.

---

25 FLF 25 – Limit Green Watchdog (Special Conditioning)

SIGNALS REMAIN ON MANUAL RESET

LGRN FLF 25:255, FLD 16:XXXXXXXX, FLD 17:XXXXXXXX

Special conditioning has detected a limit green watchdog fault for the mode identified by the fault log data. The other bits and FLD17 are currently unused.

FLD 16:00000001 – Fixed Time Mode
FLD 16:00000010 – CLF Mode
FLD 16:00000100 – Priority Mode
FLD 16:00001000 – Emergency Vehicle Mode

Flag	Description

26 **FLF 26 – Hurry Call Monitor Fault (Special Conditioning)**

SIGNALS REMAIN ON MANUAL RESET

HURY FLF 26:N

Special conditioning has detected a fault with hurry call mode:

FLF 26:1 – Hurry Call Request active for too long

FLF 26:2 – Hurry Call Mode active for too long

FLF 26:3 – Hurry Call Request and Mode Faults

---

27 **FLF 27 – Special Conditioning – General Fault 1**

SIGNALS REMAIN ON MANUAL RESET

SCF1 FLF 27:255, FLD 18:XXXXXXXX

This fault flag is available for use by special conditioning. Refer to the configuration's Special Instructions for details on why Special Conditioning has raised this fault.

For example, the Special Conditioning in the standard ST750ELV pedestrian configurations set FLF 27 if the audible monitor inputs do not match the expected state of the audible outputs. In this case, the Special Conditioning also extinguishes the signals.

---

28 **FLF 28 – Special Conditioning – General Fault 2**

SIGNALS REMAIN ON MANUAL RESET

SCF2 FLF 28:255, FLD 19:XXXXXXXX

This fault flag is available for use by special conditioning. Refer to the configuration's Special Instructions for details on why special conditioning has raised this fault.

---

29 **FLF 29 – Special Conditioning – Request Fail Flash**

SHUTDOWN

FLSH FLF 29:255

Special Conditioning has requested shutdown to hardware fail flashing; i.e. it has detected a serious fault that requires the controller to extinguish all the signals and switch on the built-in hardware fail flasher (if enabled).

Flag	Description

30 **FLF 30 – ST750 / ST750ELV Configuration / Hardware Mismatch**

SHUTDOWN

`T750 FLF 30:255`

This fault is raised and the signals remain off if the type of controller requested by the configuration does not match the controller type.

Configurations are created for one specific type of controller (as specified by the 'Hardware' field on the IC4 Administration page) and will only run on that specified type of controller; e.g. a configuration created for an ST750 will only run on an ST750 controller.

NOTE: If this fault is reported on an ST750ELV Controller, also check the communications between the main processor card and the ST750ELV IO/PSU Module.

---

31 to 32 **FLF 31 to 32 – Not Currently Used**

---

33 **FLF 33 – LSLS Outputs Faulty**

SHUTDOWN

`LOUT FLF 33:N`

`FLF 33:1` - Over current detected (short circuit to return or earth?)
`FLF 33:2` - Background test failed (short circuit to adjacent output?)

Fault data contains one bit per LSLS output (four bytes per LSLS card)
`FLD 130` = LSLS #1 Outputs 1-8
`FLD 131` = LSLS #1 Outputs 9-16
`FLD 132` = LSLS #1 Outputs 17-24
`FLD 133` = LSLS #1 Outputs 25-32
`FLD 134` = LSLS #2 Outputs 1-8
…through to…
`FLD 153` = LSLS #6 Outputs 25-32.

```
                32....25         24....17         16.....9         8.....1
LSLS#1: FLD 133:XXXXXXXX FLD 132:XXXXXXXX FLD 131:XXXXXXXX FLD 130:XXXXXXXX
LSLS#2: FLD 137:XXXXXXXX FLD 136:XXXXXXXX FLD 135:XXXXXXXX FLD 134:XXXXXXXX
LSLS#3: FLD 141:XXXXXXXX FLD 140:XXXXXXXX FLD 139:XXXXXXXX FLD 138:XXXXXXXX
LSLS#4: FLD 145:XXXXXXXX FLD 144:XXXXXXXX FLD 143:XXXXXXXX FLD 142:XXXXXXXX
LSLS#5: FLD 149:XXXXXXXX FLD 148:XXXXXXXX FLD 147:XXXXXXXX FLD 146:XXXXXXXX
LSLS#6: FLD 153:XXXXXXXX FLD 152:XXXXXXXX FLD 151:XXXXXXXX FLD 150:XXXXXXXX
```

In the rolling log the fault data will be interpreted as shown in this example:
`LSLS1/32 (K/AMB)` – LSLS#1, output 32 (which is assigned to Phase K amber aspect) is faulty

The fault FLF 33:1 'over current detected' may be caused by too many or incompatible signals being fitted (see the /SU/ document), a faulty signal, a short circuit to earth or a faulty LSLS Card.

Flag	Description
34 to 37	**FLF 34 to 37 – Not Currently Used**
38	**FLF 38 – No Dim/Bright Changes** SIGNALS REMAIN ON MANUAL RESET `NDIM FLF 38:255` No dim/bright changes were detected in a 24 hour period although dimming is configured, see KDP on page 75. If either FLF38 (NDIM) or FLF39 (DIM+) are set, the controller will force the signals into the bright state. Both faults can be cleared by 'RFL=1', but will be re-reported if the fault is detected again.
39	**FLF 39 – Too Many Dim/Bright Changes** SIGNALS REMAIN ON MANUAL RESET `DIM+ FLF 39:255` The number of dim/bright changes detected in a 24-hour period exceeds the configured limit, see KDL. If either FLF38 (NDIM) or FLF39 (DIM+) are set, the controller will force the signals into the bright state. Both faults can be cleared by 'RFL=1', but will be re-reported if the fault is detected again.
40 to 41	**FLF 40 to 41 – Not Currently Used**
42	**FLF 42 – LSLS Major Internal Fault** SHUTDOWN `LSMF FLF 42:255, FLD 15:00XXXXXX` An LSLS card has confirmed a major internal fault and shut down. The fault data identifies the card; e.g. FLD 15:00000010 = Replace the second LSLS Card.
43	**FLF 43 – LSLS Card Missing** SHUTDOWN `LSLS FLF 43:255, FLD 91:00XXXXXX` Indicates loss of communications from LSLS cards during normal operation. The fault data identifies the card; e.g. FLD 91:00000010 = Second LSLS Card.

Flag	Description

44 FLF 44 – Lamp Switch Card Fault

SHUTDOWN

LSC FLF 44:N

The controller will not illuminate the signals but log a fault on power-up if a problem with the lamp switch cards is detected. Self-Test may also help diagnose any problems detected.

Note: LV Controllers only. For ELV Controllers, refer to LSLS faults.

FLF 44:1 – Faulty Lamp Switch Cards.
Basic problem with the lamp switch cards, e.g. first and third cards found but no second card.

FLF 44:2 – Four Phase Card In Wrong Position
The controller can only support one four-phase lamp switch card and it must be the only card fitted or the last card fitted after a number of eight-phase cards.

FLF 44:3 – Not Enough Cards Fitted
To few cards are fitted to support this configuration, e.g. nine real phases are configured but only one eight phase card is fitted, or five real phases are configured but only one four phase card is fitted.

FLF 44:4 – Four Phase Card Required
The configuration requires a single four-phase lamp switch card but an eight-phase card has been detected.

Flag	Description

45 FLF 45 – ST750 Audible/Tactile Signal Switch is Stuck Closed

SHUTDOWN

AUDC FLF 45:255, FLD72:XXXXXXXX

The ST750 controller has detected that one (or more) of the audible/tactile monitors on the two audible/tactile channels has detected a voltage when there should be none, e.g. one of the switches in the circuit may be stuck closed.

The fault log data identifies the reason for the fault:

`FLD 72:00010001` – The first switch appears to be stuck closed. This switch is controlled in parallel to the lamp supply relay A and thus is checked during the relay test.

`FLD 72:00000010` – The monitor part way through the first channel's circuits has detected a voltage when there should not be any. The second switch (controlled by the main processor) may have been short-circuited.

`FLD 72:00100000` – As above but on the second audible/tactile channel.

`FLD 72:00000100` – The monitor at the output of the first channel has detected a voltage when there should not be any. The third switch (which is controlled in parallel to the green triac) may have been short-circuited, or a voltage from another source has been detected on the output.

`FLD 72:01000000` – As above but on the second audible/tactile channel.

(FLD73 is currently unused)

46 FLF 46 – ST750 Audible/Tactile Signal Failed

SHUTDOWN

AUDF FLF 46:255, FLD74:XXXXXXXX

The ST750 controller has detected that one (or more) of the audible/tactile supply has failed or the audible/tactile switches appear to be stuck open-circuit. Check the fuse F1 and the 24v DC supply on the processor card.

The fault log data identifies the reason for the fault:

`FLD 74:00000010` – The monitor part way through the first channel's circuits has not detected a voltage when the preceding two switches were closed.

`FLD 74:00100000` – As above but on the second audible/tactile channel.

`FLD 74:00000100` – The monitor at the output of the first channel has not detected a voltage when all the switches on the channel were closed.

`FLD 74:01000000` – As above but on the second audible/tactile channel.

(FLD75 is currently unused)

Flag	Description
47	**FLF 47 – Not Currently Used**
48	**FLF 48 – CPU Crystal Frequency Wrong** SHUTDOWN FREQ FLF 48:255, FLD 76:XX, FLD 77:YY On a previous power-up, the controller has detected a crystal fault and repeatedly output a message on the handset and will not illuminate the signals, see page 12. On this power-up, no such fault has been detected; however, the controller still does not illuminate the signals until the operator has cleared the fault. The crystal check compares the main processor's operating speed with the real time clock device. From this, the controller can calculate the main processor's clock speed, initially 16MHz, although 25MHz is an option for the future. If the measured speed is more than 0.1% out, a fault is reported. The fault log data shows the measured clock speed in the form XX.YY MHz, e.g. 16.12MHz would be recorded as 'FLD 76:16, FLD 77:12'. If the real time clock device is not functioning, or the main processor's operating speed appears to be more than 40MHz, both fault log data bytes will contain '255' and FLF 49 will also be set.
49	**FLF 49 – RTC Chip Failure** N/A RTCH FLF 49:255 Always set in conjunction with FLF48. The crystal check confirmed a fault with the real time clock device, i.e. its seconds register did not change.

Flag	Description

50 **FLF 50 – RAM Battery Faulty On Power-Up**

SIGNALS REMAIN ON MANUAL RESET

```
BATT FLF 50:255
```

On power-up, the controller examines RAM battery support voltage and will log this fault if it appears too low, even if both the RAM and the real time clock device (also supported by the battery) appear to be intact.

Note that the processor card is usually fitted with a 3V lithium battery and a Super-Cap capacitor. The Super-Cap on its own is capable of supporting the RAM for several hours once charged to enable the lithium battery to be changed without losing the contents of the RAM.

Therefore, the fault is only logged when both the battery and the Super-Cap are flat (or not fitted) to explain why faults may have been detected in the RAM or in the clock on the same power-up.

If a new main processor card is powered up for the first time with no lithium battery fitted, this fault will be logged since the Super-Cap will have discharged while the card has not been powered. It will take several minutes for the Super-Cap to charge enough to satisfy the battery test so the fault will not be cleared by ‘RFL=1’ and power off/on until a good lithium battery is fitted.

If required by the customer, the controller can function without a lithium battery, relying solely on the ‘Super-Cap’. In these cases, the controller should be left powered for about 15 minutes to allow the Super-Cap to charge, e.g. while the other installation checks are being performed, and then the fault can be cleared.

Flag	Description

51 FLF 51 – SDE/SA Not Enabled

SIGNALS OFF
MANUAL RESET

SDEN FLF 51:255

A stand-alone pedestrian controller will report this fault on power-up and not illuminate the signals when the SDE/SA facility is not enabled correctly.

This could be because a peripheral SDE/SA card is fitted but either:

- SDE/SA is not configured,
- Integral SDE/SA is configured, or
- SDE/SA has been disabled using the 'SDS' handset command.

The controller will also raise this fault and keep the signals switched off if SDE/SA is configured (see 'SDS') but at least one stream has none of its SDE/SA assessors allocated to physical inputs (see 'IOA'). This fault will therefore be raised when any default stand-alone pedestrian configuration is loaded (see section 3.12) since by default these configurations enable SDE/SA but have no SDE/SA assessors allocated to physical inputs.

- If SDE/SA is not required on any streams, enter 'SDS=0' to disable the facility (and do not fit an SDE/SA card).
- If SDE/SA is required on a stream, ensure that all the required assessors are allocated to physical inputs using the 'IOA' handset command.
- If SDE/SA is required on one stream but not on another, disable SDE/SA on stream 'n' using the handset command 'SDD n=1'.

Also see section 6.7 SDE/SA Commands.

52 FLF 52 – SDE/SA Data Changed By Handset

SIGNALS REMAIN ON
MANUAL RESET

SDED FLF 52:255

On a stand-alone pedestrian controller, the SDE/SA facility can be configured using various handset commands (see section 6.7 starting on page 84). This fault is raised when any configuration data is changed until the controller is powered off and back on and the controller begins using the new data. This fault is automatically cleared by switching the power off and back on; RFL=1 does not need to be entered.

While this fault is active, SDE/SA extensions will be forced active on all configured phases for safety.

Note: This fault is also set when the I/O commands IOA or IPS are used on SDE/SA inputs configured on Serial I/O Cards or Intelligent Detector Backplanes.

Flag	Description

53 FLF 53 – Local Link PV1 Fail Active or Inactive Timer has Expired

SIGNALS REMAIN ON MANUAL RESET

```
LINK FLF 53:255, FLD 80:XXXXXXXX
```

The PV1 input on the stand-alone stream identified in the fault log data has either been active longer than the time specified by LKA or inactive longer than the time specified by LKI.

While this fault is active, the pedestrian phase on that stand-alone stream will be prevented from appearing and the cabinet alarm will be illuminated.

---

54 FLF 54 – Lamp Monitor Internal Data Corruption

SHUTDOWN

```
LMUF FLF 54:255
```

The lamp monitor has detected an internal data corruption and stopped.

If red lamp monitoring is configured, 2nd red lamp faults will be forced active on all configured phases. This fault should be treated in the same way as a memory corruption fault, see FLF 11, except the lamp monitor need only be reset (using 'KLR=1') to clear the fault.

---

55 FLF 55 – Any Lamp failure

SIGNALS REMAIN ON AUTOMATIC RESET

```
LAMP FLF 55:255, A/Red 49W
```

The lamp monitor has detected a lamp fault. Use the command 'KLD' to view the lamp faults in detail rather than FLD or FDS. In the above example, phase A red has lost 49 watts. See section 9.5 starting on page 119 for information about resolving lamp faults.

Where a fault has been detected on sensors that cannot easily be interpreted as a phase and colour, the sensor and aspect numbers are shown. For example, "S33/A1 20W" indicates that a 20 watt drop in load has been confirmed on sensor 33 while aspect pattern 1 is illuminated. See section 9.2 on page 116 for more information on aspect numbers.

---

56 FLF 56 – Lamp Monitor Configuration Changed

SIGNALS REMAIN ON MANUAL RESET

```
LMUC FLF 56:255
```
[From PB801 issue 7 onwards]

The lamp monitor has detected a change to its configuration data and needs to be reset. Use the handset command KLR to reset the lamp monitor (which will automatically clear this fault) and refer to section 9.3.

Examples of the configuration data that if changed will trigger this fault are the KDP (page 75) and KLT (page 124) handset commands.

Flag	Description

57 FLF 57 – Not Currently Used

58 FLF 58 – Integral TC12-OTU Fault

SIGNALS REMAIN ON MANUAL RESET

`ANCL FLF 58:255, FLD 81:XXXXXXXX`

A fault has been detected by (or with) the integral TC12 OTU card (also known as the ancillary processor card, hence the abbreviation 'ANCL').

The fault log data identifies the reason for the fault:

`FLD 81:00000001` – Automatically set when the integral OTU has any fault in its fault log. Use the GLF (or GFS) commands to examine the OTU fault log.

`FLD 81:00000010` – The integral OTU has appeared to fail or is not connected. RFL=1 will clear this fault if the OTU is now running.

If the OTU card fails, it may have logged either a 'soft error' or a 'hard error'. These can be examined using the commands 'OTS' and 'OTH' and the values relayed to Siemens Engineering if the fault persists.

The following faults cannot be cleared by RFL=1 alone, and most require the OTU facility to be restarted by either:

- Changing the value of the OTU fitted flag (OTF),
- Powering the controller off and back on,
- Reinitialising the OTU using the initialisation commands.

`FLD 81:00001000` – Shared RAM corruption.

`FLD 81:00010000` – The shared RAM format used by the fitted OTU is not compatible with the traffic controller's firmware.

`FLD 81:00100000` – The OTU has been detected but one is not supposed to be fitted (i.e. OTF is set to zero).

Flag	Description

59 FLF 59 – Integral London IMU Fault

SIGNALS REMAIN ON

`IMU FLF 59:255, FLD 82:XXXXXXXX`

The controller has detected a fault with the IMU card.

The fault log data identifies the reason for the fault:

AUTOMATIC RESET

`FLD 82:00000010` – The IMU has appeared to fail or is no longer connected. This fault will clear automatically if the IMU is now running normally. Note that this bit is set temporarily when the IMU reboots.

MANUAL RESET

`FLD 82:00010000` – The shared RAM format used by the fitted IMU is not compatible with the traffic controller's firmware.

`FLD 82:10000000` – The 'type' of IMU is not known by this controller firmware – incompatibility fault.

All the other bits in the byte are not used.

If the IMU card fails, it may have logged either a 'soft error' or a 'hard error'. These can be examined using the commands 'OMS' and 'OMH' and the values relayed to Siemens Engineering if the fault persists.

The incompatibility faults will require power off/on to restart the interface to the IMU card and then manual reset using RFL=1.

---

60 FLF 60 – UTC Force Bit Watchdog Failure

SIGNALS REMAIN ON MANUAL RESET

`UTCF FLF 60:255`

The controller has confirmed that a UTC Force Bit has been stuck active for more than the configured timeout period – see the command UWD. While the force bit remains active, UTC mode will be disabled (on all streams). An entry will be added to the Historic Rolling Log indicating which Force bit and how long it was stuck active (see section 4.4.3).

When the Force Bit goes inactive, UTC mode will be allowed again. The FLF 60 fault flag remains set until manually cleared by RFL=1.

Important: When a MOVA unit is connected to the free-standing UTC interface this check should be manually disabled by entering the command UWD=0. The check is automatically disabled when 'Serial MOVA' is used. If the check is not disabled, it will generate faults during periods of light traffic flow when MOVA legitimately holds the same stage for a long period.

Flag	Description

61 FLF 61 – Initialisation Did Not Occur

SHUTDOWN

TKE! FLF 61:255 [From PB801 issue 8 onwards]

This fault warns the user that no initialisation has taken place even though the initialisation commands (section 5.1 on page 69) have been entered and the power switched off/on.

Check that a new valid Configuration PROM has been fitted. Note that a request to initialise the controller will be rejected if the Configuration PROM has not been changed or the Configuration PROM appears faulty (see FLF11 on page 46).

Use RFL=1 and power off/on to clear this fault flag.

62 FLF 62 – Not Currently Used

63 FLF 63 – Not Currently Used

4.7 Soft Errors

A ‘Soft Error’ occurs when an unexpected event is detected by the software. When a ‘soft error’ has been triggered, the controller is immediately shutdown and the signals are extinguished. The error code is output repeatedly to the handset at 1200 baud (7 data bits, even parity) and no other handset operations can take place. The error code also logged in the Rolling Log, see section 4.4.1. If the controller’s power is switched off and back on, the controller will attempt to start normally.

Error Codes	Details
BAD00001 BAD00003 BAD00004 BAD00008 BAD00009 BAD0000A BAD0000C BAD0000D	These error codes are generated by microprocessor exception and usually indicate a problem with the main processor card. The typical causes and recommendations are listed below: • Poor connections to devices on the CPU card such as PROMs and PLDs – Ensure all removable devices are properly fitted and not suffering from damage or corrosion. • Contamination by water or chemical – Inspect the board for evidence of this. • Dry joint – Gently flex the PCB. A dry joint may suddenly create a problem due to temperature change or mechanical input. If this is a repeat fault or affects more than one site then consider any external events such as personnel on site or weather extreme, etc. If the problem continues, replace the CPU card and return it to Siemens Poole for further investigations and repair.
BAD00005	This error occurs when the mathematics in the Lamp Monitor fail, usually because it is configured to monitor the signals using original incandescent or fluorescent tube characteristics but LED Signals have been fitted. Refer to the Technical Bulletin TB 41-0075 (issued 2002) for more details. Check the KLT handset command (page 124) to determine the type of signals that should be fitted to each sensor. At the time of writing, the ST900 and ST750 LV Controllers cannot monitor Nearside Pedestrian LED Signals and Demand Accepted LED Indicators. They can monitor LED Signals that mimic the load of incandescent signals, such as Helios LED and those fitted with an LMF module. With an “LED Lamp Switch Card”, ST900LED and ST750LED Controllers can monitor Helios CLS without an LMF module (see the KLV/KLT commands). ST900ELV and ST750ELV Controllers can monitor some types of LED Signals; see the KLT handset command on page 124.
BAD00555	Triggered by the test handset command TSE (section 5.7).
All others	Initially treat these in the same way as the BAD00001 error (above). However, if the same error code occurs a second time: • Check the Technical Bulletins to see whether problem has been reported before. If not, • Contact Siemens Poole for further advice.

5 MAINTENANCE AND MONITORING COMMANDS

The section details all the handset commands that may be used during maintenance of the controller, including commands used to monitor the functions of the controller.

5.1 Initialisation Commands

	DESCRIPTION AND REMARKS	
TKE	TKE = <Value>	3
LRN	LRN = <Value>	
CNN	CNN = <Value>	
	The correct numeric codes are contained in information supplied separately to each user. These initialisation commands can only be used to request that the controller loads the data from a new configuration PROM into the controller's RAM, also see the description of 'FLF 15'. The commands will be ignored (see FLF 61) unless the configuration PROM has been changed to avoid the possibility of inadvertently overwriting changes made using the handset to timings held in the RAM.	
	After attempting to load a new configuration, always check the CIC and CRC values match the IC4 printout to ensure that the correct PROM has been inserted and the correct configuration has been loaded in to the controller.	

5.2 Fault Log Commands

The fault log is described in more detail in section 4 starting on page 30.

	DESCRIPTION AND REMARKS	
FFS	FFS <Fault Flag 0 to 63> : <Value 0 to 255>	R

	View the fault log flags using the **F**ault **F**lag **S**can which only shows fault flags which are set followed by a short abbreviation of the name of the fault to help identify it. Also displays the handset command which should be used to view the fault log data (if not FDS) i.e.
	`FFS 12:255  DFM, see DSF`
	`FFS 21:255 CPAT, see CIE`
	`FFS 55:255 LAMP, see KLD`	

	This command is an improvement on the original FLF command (11.2).	
FDS	FDS <Fault Data 0 to 249> : <Value 00000000 to 11111111>	R
	View the fault log data using the **F**ault **D**ata **S**can. Similar to FFS in that it only displays fault data bytes which are not all zeroes.	
	This command is an improvement on the original FLD command (11.2).	

	DESCRIPTION AND REMARKS	
RFL	RFL : <Value 0 to 2> Used to **R**eset the **F**ault **L**og using 'RFL=1'; see section 4.3 on page 30.	2
LOG	LOG↵ View the time-stamped historic rolling log. See section 4.4, which starts on page 31, for more information on this log.	R

5.3 Facilities / Equipment Configured

	DESCRIPTION AND REMARKS	
IOB	IOB <Card Number 0 to 15>: <0=Not required, 1=Required> Indicates which **I/O B**oards should be fitted. Range is either 0-2 for Expansion I/O cards, or 1-15 for Serial I/O cards (and detector backplanes). Used by the controller to ensure that the minimum number of I/O cards are fitted, checked continuously and cleared automatically. Must match the number required, i.e. 'IOB X:0' means I/O card with address 'X' will not be used. To use an I/O card configured by the IC4 configuration that initially contained no required I/O lines, enter IOB Y=1 (where Y is the address of the card), power off the controller, fit the new I/O card, power on the controller. Check the LEDs on the I/O card illuminate correctly and no I/O card faults are present in the Fault Log (FLF 13).	2
LED	LED : <Mode 0 (Off), 1 (On-Default) or 2 (Auto)> Controls the operation of the Mimic LEDs on the LSLS Card: 0 = Always Off; use LED=1 to turn the LEDs back on 1 = Always On; the default setting 2 = Auto; Mimic LEDs switch off when the cabinet door is closed* (* Assumes an optional door switch is fitted)	O
OMF	OMF : <Integral OMU Fitted> If set to '1', an integral **OM**U should be **F**itted. Also known as the IMU, IRM or integral facilities processor. It is automatically set to '1' if the controller detects the card. If the OMU card is no longer required, enter 'OMF=0'.	2
OTF	OTF : <Integral OTU Fitted> If set to '1', an integral **OT**U should be **F**itted. This is normally set-up in the configuration data and should not need to be changed.	3
OTO	OTO <Unit 0 or 1> <0> : <Control Bit 0 to 23, or 255> OTO <Unit 0 or 1> <1> : <Output Line 0 to 247, or 255> **OT**U **O**utput command can be used to 'pass' the state of up to two UTC control-bits from the Integral OTU to one of the spare controller outputs.	2

	DESCRIPTION AND REMARKS	
FAC	FAC <Facility Number 0 to 59> : <Binary> **FAC**ilities table where a non-zero value indicates that the configuration is requesting (or allowing) the specified facility: FAC 0:00000000 - (No longer used) FAC 1:00000000 - (No longer used) FAC 2:00000001 - Red lamp monitoring requested FAC 3:00000001 - RTC load from UTC signal (TS2) FAC 4:00000001 - Optional phase requests in manual mode FAC 5:00000001 - Base time CLF facility requested FAC 6:00000000 - (No longer used) FAC 7:00000001 - Call/cancel facility requested FAC 8:00000000 - (No longer used) FAC 9:00000001 - Linked fixed time facility requested FAC 10:00000001 - Manual step-on mode requested FAC 11:00000000 - (No longer used) FAC 12:00000000 - (No longer used) FAC 13:00000001 - U/D facility requested FAC 14:00000000 - (No longer used) FAC 15:00000001 - Integral OTU facility requested FAC 16:00000001 - Integral OMU facility requested FAC 17:00000001 - Red lamp monitoring requested FAC 18:00000001 - Allow level 3 items to be downloaded (non UK only) FAC 19:00000000 - (No longer used) FAC 20:00000001 - Software Fail to flashing facility requested 00000010 - Hardware Fail to flashing requested (ST900ELV) FAC 21:00000001 - Auxiliary lamp sequencing commands allowed 00000010 - Modified operation for early phase termination 00000100 - RUN instruction to update conditioning timer status. FAC 22:00000001 - On-street configuration mode allowed (non UK only) FAC 23:00000001 - Fixed time to current maximum’s mode requested FAC 24:00000001 - Ripple change facility has been requested FAC 25:00000001 - Integral SDE/SA has been requested FAC 26:00000001 - ST750 controller required (also see FLF 30) 00000010 - ST750ELV controller required (also see FLF 30)	R

5.4 Identities and Issue States

	DESCRIPTION AND REMARKS	
PIC	PIC : <Text> **P**rogram **I**dentity **C**ode number. Normal response is 'PB' followed by a 3-digit number to identify the part, followed by the issue number.	R
SIC	SIC : <Text> **S**econdary (phase bus) processor **I**dentity **C**ode number. Normal response is 'PB' followed by a 3-digit number to identify the part, followed by the issue number. For the mains controller only.	R
PHS	PHS : <firmware version> Firmware part number and issue in the PHS (Phase Bus Processor – Serial)	R
CIC	CIC : <Text> **C**onfiguration **I**dentity **C**ode number. Normal response is 'EM' followed by the 5-digit manufacture number then the issue number. Note that this command shows the identity of the configuration loaded into RAM and thus does not show the identity of a new configuration PROM until it has been loaded using the initialisation commands.	R
CID	CID : <firmware version> Firmware version (part number and issue) 'desired' by the IC4 configuration currently loaded.	R
CIE	CIE : <firmware version> Firmware version (part number and issue) in the IC4 configuration that has failed to load due to a compatibility error (see FLF 21:255 on page 51).	R
CRC	CRC : <Eight Digit Hexadecimal Number> Displays the configuration data's **CRC** or 'checksum' as shown on the Administration page of the IC4 print-out, whether the configuration was loaded from a configuration PROM or loaded through the handset port. As with CIC, this command shows the checksum of the configuration that has been loaded into RAM. It does not show the checksum of a new PROM until it has been loaded using the initialisation commands. Use the command 'CRC' rather than ENC 4 to ENC 7 to view the checksum of the loaded configuration as ENC will always attempt to read the contents of a configuration PROM, even if one is not fitted. Note: This command displays the checksum of the original data from IC4; the value will not change when the controller timings are modified via the handset for example. The commands ENG 241/242 can be used to view the checksums of the data held within the controller's memory.	R

	DESCRIPTION AND REMARKS	

PLD	PLD : <Variant number and text>
	Displays the variant part of the part number of the **P**rogrammable **L**ogic **D**evice installed in the CPU card, e.g. PB821/000 or /101, as well as a brief description of the facilities allowed by that variant of PLD, e.g.
	`PLD:000 LMU` LMU enabled
	`PLD:101 BASIC` LMU disabled
	`PLD:102 LMU+SDE` (no longer used)
	`PLD:121 SINGLE PED` Single pedestrian stream only
	`PLD:122 PED ONLY` Stand-alone pedestrian streams only
	If a PLD variant 'NNN' is not recognised, one of the following will be displayed:
	`PLD:NNN BASIC?`
	`PLD:NNN RESTRICTED?`
	Also see the description of FLF 21 (CPAT) on page 51.
		R

VIO	VIO <I/O Card 1-15> : <firmware version> Firmware version (part number and issue) in each serial I/O card and backplane (addresses 1 to 15)	R
VLS	VLS <LSLS Card 1-6> : <firmware version> Firmware version (part number and issue) in each LSLS card (addresses 1 to 6)	R

5.5 Lamp Supply Commands

	DESCRIPTION AND REMARKS	
KEV	KEV : <volts> **E**lectrical **V**olts displays the lamp supply voltage in volts. From PB801 issue 8 onwards, this reading can be calibrated on an LV Controller (ST900 or ST750). If the value displayed differs from the measured RMS voltage, enter the correct value, e.g. "KEV=230".	3
KLV	KLV : <Lamp Supply Voltage Type: 0 to 6> The configured **L**amp Supply **V**oltage Type. This command is described in more detail on page 123 in the lamp monitor section.	3

	DESCRIPTION AND REMARKS	
LBT	LBT : <45 to 255 volts> [Not ELV] **L**ow lamp supply **B**right **T**hreshold used to determine when the supply has dropped too low. The lamps are extinguished when the lamp supply drops below 'LBT' volts for 'LSF' mains cycles and the fault FLF17 is logged after 'LST' seconds. FLF17 is detailed on page 49. The values shown by LBT, LBH, LDT and LDH are ignored on the ST750ELV and ST900ELV controllers because these controllers use their own built-in ELV limits. **IMPORTANT:** The LBT and LDT thresholds should not be set lower than 100V on a 200-240V controller or 45V on a 100-120V controller because lamp monitoring will be suspended below these voltages.	3
LBH	LBH : <0 to 255 volts> [Not ELV] **L**ow lamp supply **B**right **H**ysteresis used to determine when the supply has been restored. The lamps automatically restart when the lamp supply has risen above 'LBT+LBH' volts for 'LSN' seconds.	3
LDT	LDT : <45 to 255 volts> [Not ELV] **L**ow lamp supply **D**im **T**hreshold is used for the same purpose as LBT, except that LDT is used when the lamp supply has been dimmed	3
LDH	LDH : <0 to 255 volts> [Not ELV] **L**ow lamp supply **D**im **H**ysteresis is used for the same purpose as LBH, except that LDH is used when the lamp supply has been dimmed.	3
LSF	LSF : <1 to 25 mains cycles, i.e. 20 to 500ms at 50Hz> **L**ow lamp supply **S**witch of**F** time specifies over how many mains cycles the controller confirms that the supply has actually dropped too low. **IMPORTANT:** This value is defaulted to four mains cycles (80mS) and should not be modified without first consulting Siemens.	3
LSN	LSN : <1 to 255 seconds> **L**ow lamp supply **S**witch o**N** time specifies over how many seconds the controller confirms that the supply has risen back above the threshold plus the hysteresis. Also see LST (below).	3
LST	LST : <0 to 255 seconds> **L**ow Lamp **S**upply Fault **T**ime specifies the delay before the fault FLF17 is logged (detailed on page 49). The fault will be automatically cleared when the controller confirms that the supply has been restored. The default values for LSN and LST are four seconds. If the FLF17 fault is logged on a normal power breaks, the LST value may be set too low. If LST is set to 255, no fault is logged (not recommended). If the LST value is set the same or lower than the LSN value, time-stamped FLF17 events will be recorded in the historic rolling log when a supply dip causes the traffic signal sequence to restart. If the LST value is set higher than the LSN value, these events may not be logged on a short supply dip, even if the signal sequence restarts.	3

	DESCRIPTION AND REMARKS	
RRT	RRT : <Idle (0), Requested (1), Running(2)> **R**equest **R**elay **T**est using 'RRT=1↵' will initiate a test of the lamp supply relays. The test will only be performed if the signals are on and normally takes 2 minutes to complete (since the relays are checked once a minute), but may take longer if the controller has to retry a test. Note that a relay test is automatically requested every power-up and at 3am every night (configurable). 'RRT:2' is displayed while the test is running (automatically or manually initiated), which returns to 'RRT:0' when it is complete. The fault flag 'FLF 4' will be set and the lamps extinguished if a fault is detected, see page 42.	3

5.6 Dim/Bright Facility

	DESCRIPTION AND REMARKS	
KDP	KDP : <Dimming Present? (0, 1 or 2)> Is **D**imming **P**resent on this controller? Set to '0' if dimming is disabled, i.e. the signals are to remain bright. Set to '1' if dimming is required. The lamp monitor (if enabled) will need to learn the lamp loads in both dim and bright and will ensure that at least one dim/bright change occurs every 24 hours otherwise FLF 38 is set (see page 58). Set to '2' if dimming is required but no checking is required. Use this option when the solar cell sometimes does not operate due to bright street lighting or when the selected dim voltage is too close to the bright voltage for the controller to confirm the dim/bright change. **IMPORTANT:** Always reset the lamp monitor (KLR=1) after enabling or disabling dimming using this command. **IMPORTANT:** Do not use the 'KDP:2' setting on ST900LED or ST900ELV Controllers (i.e. controllers monitoring LED signals directly) with firmware prior to PB801 issue 11 (or PB800 issue 27 on ST800).	2
DOV	DOV : <Override to Bright? (0 or 1)> **D**im **Ov**erride forces the lamps to the bright state.	2
KDL	KDL : <0 to 255 changes> **D**imming **L**imit set the maximum number of dim/bright changes allowed in any 24-hour period. The lamp monitor will log a fault (FLF 39) if it detects more changes than configured by this command.	2
KDB	KDB : <State 0, 1 or 2> **D**im/**B**right state shows the dim/bright state confirmed by the lamp monitor, where 0=no change yet, 1=dim, and 2=bright.	R

Also see sections 8.11 and 8.12 for the 'SO' input dimming type command 'DIT'.

5.7 Test Facilities

	DESCRIPTION AND REMARKS	
PHD	PHD <Phase A to F2> : <Continuous demand (1) > Introduce an operator **Ph**ase **D**emand for the specified phase. The demand is inserted continuously until explicitly cleared, e.g. 'PHD A=0'.	2
PHE	PHE <Phase A to F2> : <Continuous extension (1) > Introduce an operator **Ph**ase **E**xtension for the specified phase. The extension request is inserted continuously until explicitly cleared, e.g. 'PHE A=0'.	2
LMP	LMP <Phase A to F2> : <Colour 1 (red), 2 (amber) to 3 (green) or 0> Initiates the **L**a**MP** test for maintenance and fault-finding purposes only and will only function if the signals are initially switched off using the switch on the manual panel. For example, enter 'LMP A=1' to illuminate phase A red only. Press any key to stop the test and extinguish the signal. ***WARNING*** **USE WITH EXTREME CARE. THE RISKS TO ROAD USERS AND PEDESTRIANS SHOULD BE ANALYSED AND APPROPRIATE PROTECTIVE MEASURE TAKEN, WHICH MAY INCLUDE SIGNAGE OR COVERING OF THE SIGNALS.**	3
TWD	TWD : <Trip Request> **T**rip **W**atch**D**og – 'TWD=1' stops the main processor kicking the hardware watchdog to test that it then times out and extinguishes the signals. Alternatively, entering 'TWD=2' stops the main processor kicking the software watchdog to the second (phase bus) processor to test that it can also extinguish the signals. ***WARNING*** **CAUSES IMMEDIATE SHUTDOWN AND THEREFORE MUST NOT BE USED UNDER ANY CIRCUMSTANCES TO TEST EQUIPMENT WITH SIGNALS ON AND CONTROLLING TRAFFIC.**	3
TSE	TSE **T**rip **S**oft **E**rror – For Engineering Use Only ***WARNING*** **MUST NOT BE USED UNDER ANY CIRCUMSTANCES TO TEST EQUIPMENT WITH SIGNALS ON AND CONTROLLING TRAFFIC.**	3
TCS	TCS **T**rip **C**heck **S**um – For Engineering Use Only ***WARNING*** **MUST NOT BE USED UNDER ANY CIRCUMSTANCES TO TEST EQUIPMENT WITH SIGNALS ON AND CONTROLLING TRAFFIC.**	3

	DESCRIPTION AND REMARKS	
FRE	FRE 0 : <Current Free Time> FRE 1 : <Second Lowest Free Time> FRE 2 : <Lowest Free Time> Displays the controller's **FRE**e processor time as a percentage to give an indication of how heavily loaded it is, i.e. how complex the configuration and special conditioning is. 'FRE 0' is updated every 200ms and gives a live indication of the processor load. If this value consistently falls below 20%, consult Siemens Engineering in Poole. The lowest value seen in 'FRE 0' is automatically stored in 'FRE 2', while the second lowest value is stored in 'FRE 1'. These values show the lowest values since the last power-up or since they were manually reset back to '100%' using 'FRE 2=100'.	2
KPU	KPU 0 : <Last Power-up Type: 1 to 3 (below), or 0 (first time power-up)> KPU 1 : <Count of Power-ups following Normal Power Down> KPU 2 : <Count of Power-ups following Software Errors> KPU 3 : <Count of Power-ups following Unexplained Shut Downs> **P**ower **U**p codes show the number of times the controller has been powered off and back on, since the first time it was powered up or since the value was reset using this command.	2
TMA	TMA : <Access Code> **T**est **M**ode **A**ccess code. Enter 'TMA=252' to freeze the traffic controller to allow it to be single stepped, see TMC and TMT. Will return 'TMA:0' if the facility is not running. The default operation of this facility ensures that it can only be enabled if the signals are switched off using the manual panel switch. This test facility freezes the entire controller, including the real time clock, while still allowing the handset to function so that the state of the controller can be examined in detail.	3
TMC	TMC : <Count-down> **T**est **M**ode **C**ountdown. Once the controller has been frozen using TMA above, the controller can be requested to run for a number of seconds before freezing again. For example, entering 'TMC=10' will allow the controller to run for 10 seconds, and while it is running, the display will decrement, showing '9', '8', etc., until it returns to '0'.	2
TMT	TMT : <Timer Value> **T**est **M**ode **T**imer Automatically runs a 'stopwatch' timer showing exactly how long the controller has been allowed to run. While the controller is actually running and not frozen, this value increments. To reset the timer, simply enter 'TMT=0'.	2

Tip! While either 'TMC' or 'TMT' are being displayed, press the space bar and the controller will run for one second; e.g. press it three times in quick succession and the controller will run for three seconds and then freeze again.

5.8 Status Commands

	DESCRIPTION AND REMARKS	
STS	STS <Stream 0 to 7> : <Mode> <Stage> <Status> **St**atus of the **S**tream displays information such as the current mode and stage and whether minimum or maximum green timers are running. The '**mode**' information will be one of the following: 'FIXTIME' – fixed time mode is running 'VA-SETx' – VA mode is running, using alternate maxset 'x' 'FT-SETx' – Fixed time to current (i.e. maxset 'x') maximums 'CLFp,gg' – CLF mode is running CLF plan 'p' and group 'gg' 'MANUAL ' – Manual mode is running 'HURRYx ' – Hurry call mode is running and unit 'x' is active 'UTC-Fxx' – UTC mode is running and stage 'xx' is being forced 'PARTIME' – Part-time mode is running 'STARTUP' – Start-up mode is running 'STEP-ON' – Manual step-on mode is running 'EM/VEHx' – Emergency vehicle mode is running and unit 'x' is active 'PRIVEHx' – Priority vehicle mode is running and unit 'x' is active 'VAP-MAX' – VA mode running 'MAX' timings (stand-alone ped. stream) 'FVP-MEX' – Fixed Vehicle Period mode running 'MEX' timings 'MODExx ' – Mode 'xx' is running; e.g. failure mode 0 Note that if more than one unit is active '+' is displayed instead of the unit number, e.g. 'HURRY+'. For stand-alone streams, the 'MAX'/'MEX' indications will be: 'PV ' – when UTC PV (or its pedestrian window) is active, 'PV1' – when local link PV1 (or its pedestrian window) is active, 'CLF' – when IFN influences 8 and 9 are active. The '**stage**' information shows the current stage, e.g. 'S2', or the previous and next stages during a stage to stage mode, e.g. 'S2-3'. The '**status**' information will show either: 'MIN' if any minimum green timers are running 'FVP' if the fixed vehicle period is running during FVP mode 'MAX' if any maximum green timers are running 'A/R' while an all-red hold is active 'RLM' while any red lamp monitoring delay is running 'DFZ' while any phase delay is running 'PBT' while any minimum clearance period is running 'CMX' while any extendable clearance period is running 'CDY' while any clearance delay period is running 'CRD' while any clearance red period is running 'PAR' while any pedestrian all-red period is running 'SDE' if any speed clearance requests have been actioned	R

	DESCRIPTION AND REMARKS	

SPH	SPH <Phase A to F2> : <Status>
	
	Status of a **Ph**ase displays information such as whether the phase is demanded or whether its minimum green timer is running.
	
	If the display width has been reduced to 14 characters (see page 21), eight binary bits are displayed.
	
	If the display width is still set to at least 20 characters wide, instead of the binary information, text is displayed when the bit would have been set to '1', otherwise '`---`' is displayed in its place:
	
	`SPH A:MIN EXT+ MAX DLY` (when at right of way)
	
	`SPH A:DEM RLMI SEQ DLY` (when not at right of way)
	
	This format also shows one extra piece of information '`RLMI`' which shows when red lamp monitoring has inhibited the phase.
	
	Each bit or abbreviation indicates the phase is…
	
	`00000001 – DEM - Phase is being demanded*`
	`00000010 – EXT+ - Phase extension requested`
	`00000100 – MIN - Timing minimum green period`
	`00001000 – EXT - Phase extension being timed off`
	`00010000 – MAX - Timing maximum green period`
	`00100000 – DLY - Timing leading or lagging phase delay`
	`01000000 – SEQ - Timing lamp sequence set, e.g. red/amber time`
	`10000000 - - Not currently used`
	
	* Note that if the controller is running any mode other than VA, a demand may be inserted by that mode (e.g. fixed time to current maximums) or the street demand may require further processing by the mode before being accepted (e.g. CLF mode).
		R

6 INPUT AND OUTPUT

6.1 I/O Layout

The traffic controller firmware can use up to 31 I/O ports (numbered 0 to 30) giving 248 I/O lines (numbered 0 to 247), although these numbers may be limited by the controller type.

Each I/O port normally contains 8 input lines (for detectors and pushbuttons, etc.) or 8 output lines (for UTC reply bits, etc.), although there are only 4 outputs on the 24 Input / 4 Output variant of the Serial I/O Card. The I/O card number is set by a rotary switch on each card.

Always refer to the works specification / IC4 printout for the I/O used by a particular installation.

6.2 Configuring the Standalone Pedestrian Controller

The signals of the stand-alone pedestrian controller should not be switched on until all of the appropriate facilities have been configured (or disabled) using the handset as described in configuration's special instructions. The I/O is no exception.

The I/O will be allocated via the Configurator, as normal for the controller, however these allocations will be to the 'logical' I/O lines. The Configurator may initially de-allocate several less frequently used inputs and outputs. If these 'logical' I/O lines, i.e. functions, are required, they must be allocated to physical I/O lines.

Logical I/O lines initially enabled can be de-allocated if not required to free up their physical I/O lines.

For example, if one of the configured vehicle detectors, pushbuttons, kerbside or on-crossing detectors is not required, e.g. a kerbside detector on input 12, that input may be de-allocated by setting 'IOA 12=255'. This frees up input 12 so another logical input may use it, e.g. an on-crossing detector on I/O line 48 may be moved to this physical I/O line using 'IOA 48=12'.

In the above example, the commands to re-arrange the I/O using IOA and review the changes using IOR would be:

```
IOA12=255↵   IOA 12 BKBS1:255
IOA48=12↵    IOA 48 BONC3:12
IOR12↵       IOR 12:48 BONC3
IOR48↵       IOR 48:NONE
```

Tip! After using the IOA command to re-arrange the I/O, always use the IOR command to review the I/O allocations. Use IOR to check that each physical I/O line has been assigned the required logical I/O line (i.e. the required logical function) or that 'NONE' is displayed if the physical I/O line is not used.

Note that almost all I/O commands access the logical I/O lines. Only IOP, IOR and CUD access the physical I/O lines.

6.3 Basic I/O Commands

Note: The firmware will display the function of each I/O line, i.e. the mnemonic configured on IC4 after the I/O line number on many handset commands. For example, if 'AX' is the 'name' assigned to I/O line 0, '`DET 0 AX:2`' would be displayed.

	DESCRIPTION AND REMARKS	
DET	DET <Logical I/O Line 0 to 247> <Function>: <Force Request 0 to2 > Force the **DET**ector's state to either 'Not Operated' (0), 'Operated' (1) or 'Normal Operation' (2). Can also be used to force the states of output lines as well as the state of detector inputs. Setting any I/O line to 99, e.g. 'DET 0=99', returns that I/O line and all the others back to normal operation, i.e. to '2'. Note that DFM is automatically suspended to avoid it timing out while a detector is being forced inactive (0) or active (1) by DET.	2
IOA	IOA <Logical I/O Line 0 to 247> <Function> : <Physical I/O Line 0 to 247> **I/O** Line **A**llocation. Displays the function and physical mapping of each logical I/O line on the controller. The function is displayed as the mnemonic used on the Configurator (read only). The physical I/O line number can be changed to 'move' the I/O line (0-247) or to disable it using 255 (input forced inactive) or 254 (input forced active).	3
IOR	IOR <Physical I/O Line 0 to 247> : <Logical I/O Line 0 to 247> <Function> **I/O** Line **R**eview. Displays the function and logical mapping of each physical I/O line on the controller. The function is displayed as the mnemonic used on the Configurator. Where several functions, i.e. logical I/O lines, have been mapped to the same physical input I/O line, these are displayed in order.	R

IOP	IOP <I/O Physical Port Number 0 to 30> : <Binary>
	Displays the **I/O P**hysical port states as the inputs enter the controller before any processing (except U/D) is performed, or as the outputs leave the controller.
	Inputs: 0=Open-Circuit; 1=Closed-Circuit Outputs: 0=De-energised; 1=Energised
	Each I/O port displays the information for 8 I/O lines, with the first (lowest I/O line number) input appearing on the right, e.g. if the input lines 2, 3, 4 and 7 were closed-circuit, the following would be displayed for I/O port 0.
	`IOP 0:10011100`
	`7......0`
	Note that detector inputs can be simulated while IOP is viewing an input port using the keys '0' to '7', see section 3.7 on page 20.
		R

IOL	IOL <I/O Logical Port Number 0 to 30> : <Binary> **I/O L**ogical Port displays the state of the 8 lines on each logical I/O port. It shows the state of the input after any IOA mapping, IPS inversion or forcing of the input has been applied, so '1' indicates input active. Note: Where the I/O has been re-arranged using IOA, IOL shows the I/O lines in their original IC4 positions.	R
IPS	IPS <Logical I/O Line 0 to 247> <Function>: <(0 or 1; 1=Inverted)> **I**/O **P**in **S**ense indicates that the controller should invert the specified I/O line. Inputs are closed-circuit for detect by default; set IPS to '1' for open-circuit for detect. Logic '1' on an output energises the relay output by default; set IPS to '1' to invert this.	2

	DESCRIPTION AND REMARKS	
IPX	IPX <I/O Line Number 0 to 247> : <0.0 to 31.8 seconds> Detectors that extend the phase green period, on-crossing detector inputs and pushbutton, cycle detector and kerbside detector inputs can all be assigned individual extension times using IPX, see sections… 8.2 ‘Pedestrian Clearance Period’ on page 99. 8.9 ‘VA Operation Timings’ on page 105. 8.3 ‘Pedestrian and Cycle Crossing Demands’ on page 101.	3

6.4 Detector Fault Monitoring (DFM) Commands

	DESCRIPTION AND REMARKS	
DSF	DSF < I/O Line Number 0 to 247> : <0=Failed Inactive, 1=Failed Active> A **D**etector’s **S**tate on **F**ailure. Indicates whether an input has failed DFM stuck inactive or active. Auto-scans to only show the failed I/O lines. Also displays the name of the I/O line assigned in IC4. Also see FFS 12:255 on page 69.	R
ADF	ADF : <Request> **A**ccept **D**etector **F**aults by entering ‘ADF=1’ and extinguish cabinet alarm lamp thereby permitting indication of any further detector faults. To re-establish fault monitoring for detectors accepted as faulty and to re-illuminate the cabinet alarm, the DFM facility should be reset, either by using the RDF command (see below) or by simply entering RFL=1. ENG122 can be used to view accepted DFM faults.	2
DFA	DFA <I/O Line Number 0 to 247> : <Action Code 0 to 2> **D**etector **F**ault **A**ction – whether the detector’s state should be forced when the detector is reported as faulty by DFM or the I/O Card fails (see FLF 13). 0 – override to inactive 1 – override to active 2 – use current input state. Note that on kerbside inputs, if kerbside testing is configured, the input is forced active regardless of the DFA setting.	2
DFS	DFS <I/O Line Number 0 to 247> : <Suppress Monitoring (1) > **DF**M **S**uppress disables monitoring on the specified detector.	2
DGP	DGP <I/O Line Number 0 to 247> : <DFM Group 0 to 7> **D**FM **G**rou**P** for the specified detector or 255 if not monitored.	2

	DESCRIPTION AND REMARKS	
DSA	DSA <DFM Group 0 to 7> <DFM Alt. Set 0 to 3> : <Active Fail Time> **D**FM **S**et **A**ctive times for the specified DFM group (see DGP above) and timeset in the range 0 to 254 minutes, or disables monitoring of the active state by setting the time to 255. DFM Alternative Set 0 = Normal DFM time set DFM Alternative Set 1 = DFM Alternative time set B (ALTDFMB) DFM Alternative Set 2 = DFM Alternative time set C (ALTDFMC) DFM Alternative Set 3 = DFM Alternative time set D (ALTDFMD)	2
DSI	DSI <DFM Group 0 to 7> <DFM Alt. Set 0 to 3> : <Inactive Fail Time> **D**FM **S**et **I**nactive times for the specified DFM group and timeset in the range 0 to 254 hours, or disables monitoring of the inactive state by setting the time to 255.	2
DTO	DTO : <Request Time Override (1) > **D**FM **T**imes **O**verride sets all the DFM times to 1 minute for test purposes while the command is set to '1'. Note that faults reported while DTO is set to '1' do not appear in the historic rolling log.	2
PBG	PBG <DFM Group 0 to 7> : <Used By Push Buttons (1)> **P**ush **B**utton DFM **G**roups, i.e. which DFM groups are used to monitor push-buttons (1) and which are used to monitor vehicle detectors (0). Currently this information is only used by the London IMU.	2
RDF	RDF : <Request DFM Reset (1) > **R**eset **D**etector **F**aults so that detectors which have changed state since the fault was reported are no longer forced (see DFA) and no longer illuminate the cabinet alarm. RDF=1 clears the faults from the logs and extinguishes the System Error LED (assuming no faults remain). RFL=1 can also be used to reset detector faults and remove entries from the fault logs.	2

6.5 Call Cancel

	DESCRIPTION AND REMARKS	
DCL	DCL <Unit Number 0 to 7> : <0 to 255 seconds> **D**etector **C**all/cancel cal**L** period.	2
DCN	DCN <Unit Number 0 to 7> : <0 to 255 seconds> **D**etector **C**all/cancel ca**N**cel period.	2

6.6 U/D Commands

	DESCRIPTION AND REMARKS	
CUD	CUD <U/D Unit Number 0 to 7> : <Physical I/O Line Number 0 to 247, or 255> **C**onfigures the **U**/**D** unit to pre-process the specified I/O line (the 'A' loop) using the uni-direction algorithm, so only vehicles travelling in the correct direction are detected. In order to determine direction, a second detector (the 'U' loop) is required and this should be connected to the very next I/O line number. Note that IOP and IOL show the processed state of the 'A' loop, i.e. if the 'U' loop is activated first, the 'A' loop will remain inactive as seen by IOP, even if the input to the controller is actually activated.	2
UDT	UDT <U/D Unit Number 0 to 7> : <U/D Time-out 0 to 254 or 255> Specifies the **U**/**D** **T**ime-out value in units of 10 seconds. If either loop remains active for longer than this time, the 'A' loop is forced active so that the controller sees a demand. Setting the time to 255 disables the time-out option.	2

6.7 SDE/SA Commands

	DESCRIPTION AND REMARKS	
SCT	SCT <Phase A to F2> : <0 to 50 seconds> **S**peed **C**learance **T**ime for the specified intersection vehicle phase. **NOTE:** It is a UK requirement that on stand-alone pedestrian streams, the vehicle to pedestrian all-red period is fixed at three seconds if SDE/SA is configured. The SCT value is ignored.	3
SCI	SCI <Index 0 or 3> : <Binary> **S**peed **C**learance extending **I**ntergreen where each binary bit indicates that the particular phase has a clearance request active during the current stage to stage movement. `SCI 0:HGFEDCBA` – Phases A to H `SCI 1:PONMLKJI` – Phases I to P `SCI 2:XWVUTSRQ` – Phases Q to X `SCI 3:FEDCBAZY` – Phases Y and Z, and A2 to F2	R
SCR	SCR <Index 0 or 3> : <Binary> **S**peed **C**learance **R**equest active where each binary bit indicates that the particular phase has a clearance request active. The display format is similar to SCI above.	R

	DESCRIPTION AND REMARKS	
SEA	SEA <Index 0 or 3> : <Binary> **S**peed **E**xtension timers **A**ctive. Each binary bit indicates that the SDE/SA extension timer is activated for that particular phase. The display format is similar to SCI above.	R
SPE	SPE <Assessor Number> : <Loops> <Ext> <Speed (mph & kph)> Displays the loop activations and the calculated **Spe**ed in both miles per hour and kilometres per hour for the requested SDE/SA assessor. It will also display 'E' if and when this assessor is generating an extension. The loop activations will display: `---` if neither loop is occupied, `0--` when only the first loop (the 'a' loop) is occupied, `-0-` when both loops are occupied, and `--0` when only the second loop (the 'b' loop) is occupied, `---` when both loops are unoccupied again. This command allows internal SDE/SA to be commissioned without needing a SoundMark test set. However, if peripheral SDE/SA has been configured, this command will just display 'SPE n:External'. If SDE/SA is not configured or it has been disabled by command SDS, this command will display 'SPE n:Disabled'.	R
SDS	SDS : <Value 0 to 2> - <'None'/'SA'/'SDE'> <'INT'/'EXT'> **SD**E **S**elect displays the selected type of high-speed vehicle detection: 0 = None, SDE/SA disabled. 1 = SA, Speed Assessment configured. 2 = SDE, Speed Discrimination configured (also see SAT). Following the value 0 to 2, the handset will display as text the type of high speed vehicle detection configured, if any, and a read only indication of whether the SDE/SA is provided internally by the main processor or externally by the peripheral SDE/SA card. Use this command on a stand-alone pedestrian controller to enable or disable the facility as required.	3
SDD	SDD <Stream 0 to 7> : <1 to disable SDE/SA on this stream> **SD**E/SA **D**isabled on the specified stream. Use this command on a stand-alone pedestrian controller to disable SDE/SA on individual streams when SDE/SA is required on others. Also see FLF 51 (SDEN) on page 63.	3

	DESCRIPTION AND REMARKS	
SAT	SAT <Assessor Number 0 to 31> : <Value 1 to 3> (<Phase>,<Type>) **S**DE **A**ssessor **T**ype can be used to display and alter (stand-alone pedestrian controllers only) the type of each SDE assessor, where: 1 = Double SDE Assessor ('Doub') 2 = Triple Inner Assessor ('Tinn') 3 = Triple Outer Assessor ('Tout') If SA is configured using SDS, '4' will be displayed, but if neither SDE nor SA is configured, '0' will be displayed. After the value, the handset will also display the (first) phase associated with that assessor and the type as text, e.g. '`SAT 0:1 (A,Doub)`'. If one or more SDE/SA assessors in a stand-alone pedestrian controller default configuration are not required, their inputs can be de-allocated using the IOA handset command like any other inputs (see page 80). If no SDE/SA assessors are required, SDE/SA should also be disabled using SDS=0 (see above). (This command replaces the T400 Pelican command SDT)	3

7 MASTER TIME CLOCK / CABLELESS LINKING COMMANDS

7.1 Setting the Real Time Clock

To synchronise a controller to the rest of a mains synchronised system, use the following procedure:

Synchronising a controller within a mains synchronised system should not be attempted during hours of peak electricity supply usage (0700 hrs to 0900 hrs and 1630 hrs to 1900 hrs).

1) Go to the nearest controller that is already set to system time. From this controller accurately set a watch (preferably a digital watch) to the system time.
2) Then proceed to the controller to be set.
3) Ensure the controller to be set has mains frequency as its synchronising source (handset command CTS = 0). Then set the time accurately from the watch using the TOD command.
4) Return to first controller and re-check watch time against it. If there is significant drift, re-synchronise watch to controller time and return to the controller just set up and reset its time as in step 3 above.
5) If a number of controllers are to be set to system time, always return to the ‘base time’ controller in between going to each controller to be set to prevent any cumulative error.

7.2 Setting a Number of Real Time Clocks

This procedure details how to set-up a small number of controllers to the same mains synchronised time. This is particularly important if the controllers use the CLF (cableless link facility).

To eliminate time deviations between controllers due to mains’ frequency drift occurring during the synchronisation of multiple controller systems, all controllers in the system must be synchronised to a mains frequency reference source at an identical time. This time must be at a point in the future which will allow the real time clocks for all the controllers to have been set up.

To achieve this use the following procedure on each controller:

1) Set up the time at which the changeover from crystal to mains frequency reference source is to occur. This time must be set far enough ahead to allow the real time in all the controllers to be set in the system.

   Use the handset commands:
   MST 0 = day required (0=Saturday to 6=Friday)
   MST 1 = hours required
   MST 2 = minutes required
   MST 3 = seconds required

2) Now set the master time clock reference source to crystal with changeover to mains at time set by MST command using the handset command CTS = 1. Check that after four seconds, it remains at 1.

3) Now set up the master time clock using TOD as accurately as possible with a digital watch.

4) This procedure should be repeated on all controllers in the system, setting up the master time clock against the digital watch and ensuring that the changeover time from crystal to mains reference source as set up in step 1 are identical.

Ensure that all controller real time clocks have been set up before the changeover time is reached.

7.3 Real Time Clock Commands

	DESCRIPTION AND REMARKS	
TOD	TOD : <Time and/or Date> **T**ime **O**f **D**ay command can be used to view or set the clock. When viewing the time of day using the default display width of 20 characters or wider (see page 21), the display shows the date, time and day of the week all on one line. If the display width has been reduced to 14 characters, the '+' key can be used to view the date and then the day of the week. To set the clock, simply type '=' and the required date or time with no separators, e.g. '=12JUL12↵' and '=1135↵'.	2
CTS	CTS : <Timing Source 0 to 2> **C**lock **T**iming **S**ource set to (0) Mains or (2) Crystal Synchronisation. Alternatively, the clock can be initially set to crystal synchronisation and then switch over to mains' synchronisation when the time specified by MST is reached. See page 87 for more information.	2
MST	MST 0 : <0 (Sat) to 6 (Fri)> MST 1 : <0 to 23 hours> MST 2 : <0 to 59 minutes> MST 3 : <0 to 59 seconds> **M**ains **S**ynchronisation **T**ime, i.e. the time at which this and the other controllers in the area should switch from crystal synchronisation (CTS:1) to mains synchronisation (CTS:0) so that they are all running the same time.	2
PFT	PFT 0 : <0 to 30 days> PFT 1 : <0 to 23 hours> PFT 2 : <0 to 59 minutes> **P**ower **F**ail **T**ime – if the controller is powered off for longer than this time, on power restoration fault FLF7 is set in the fault log and CLF disabled until the time is re-entered.	2

	DESCRIPTION AND REMARKS	
CKA	CKA : <Date 0 to 31> <Month JAN to DEC> <Year 00 to 99> **C**loc**K** to **A**dvance by one hour at 2am on this date for daylight saving. Enter 'CKA=25MAR07↵' for example to set the date or 'CKA=0↵' cancel the option (the display will show '`CKA:00-XXX-00`'). Once actioned, the date is automatically adjusted to find the same day in the following year so that it does not need to be set-up every year. Only when the required date is moved to the following week will the date need to be changed manually. The controller will display '`CKA:BSA IN USE`' if the week number system has been set-up using WEK and BSA below.	2
CKR	CKR : <Date 0 to 31> <Month JAN to DEC> <Year 00 to 99> **C**loc**K** to **R**etard (be put back) by one hour at 2am on this date for daylight saving. Once actioned, the date is adjusted as for CKA above. The controller will display '`CKR:BSR IN USE`' if the week number system has been set-up using WEK and BSR below.	2
WEK	WEK : <Week Number: 1 to 52> Sets the **WE**e**K** number for use in conjunction with BSA and BSR to control advancing the clock for daylight saving. This 'week system' method is an alternative to 'date system' method used with the CKA and CKR commands.	2
BSA	BSA : <Week Number: 1 to 52, or 0> **B**ritish **S**ummer time **A**dvance sets the week on which the controller's clock should be put forward one hour. Also see 'WEK' above.	2
BSR	BSR : <Week Number: 1 to 52, or 0> **B**ritish **S**ummer time **R**etard sets the week on which the controller's clock should be put back one hour. Also see 'WEK' above.	2
CKS	CKS: <Clock synchronisation time> Displays the time and date of the last GPS **C**loc**K S**ynchronisation. When viewing the last synchronisation time using a display width of 20 characters or wider, the display shows the date and time of day on the one line. If the display width has been reduced to 14 characters, the '+' key can be used to view the date and then the day of the week. Entering 'CKS=1↵' or 'CKS=0↵' will set this time back to midnight on January 1st 1990, causing the controller to immediately attempt to re-synchronise its clock to the received GPS messages.	2
CKM	CKM: <GPS clock message> GPS **C**loc**K M**onitor command is used to display the last message from the GPS receiver. This will indicate if the controller is getting valid GPS clock synchronisation times. The format of the display will be as follows: `CKM:$GPRMC,hhmmss,status` Where: '`hhmmss`' = time of day And: '`status`' = A (available) or V (not available)	2

7.4 Timetable Commands

	DESCRIPTION AND REMARKS	
SWS	SWS <Time-switch Event 0 to 31> : <Active (1) or Inactive (0)> Time-**SW**itch **S**ettings displays the state of each time-switch event, either active or inactive. Can also be used to override a time-switch event until the next timetable event (or CCP is used).	2
TDY	TDY <Day Code 0 to 15> : <Text Description> **T**imetable **D**a**Y** codes displays the configured codes as follows: 'Sun', 'Mon'… if the day code just selects a single day. 'XSu', 'XMo'… if the day code selects all but one particular day, e.g. 'everyday except Sunday' or 'everyday except Monday'. 'WEK', 'WKD' or 'WND' if everyday (all week), every weekday or just the weekends (Saturday and Sunday) are selected, respectively. If the days selected by the day code do not match any of those above, the display is of the form 'MTWTFSS', e.g. if only Monday, Wednesday and Friday are selected, 'M-W-F-' is displayed.	R
TTB	TTB <Entry 0 to 63> : <Day Code> <Time> <Operation> This **T**ime**T**a**B**le command displays and modifies the same time-switch table as TSW, but on a wide screen will display the whole entry on one line. For example, if entry 0 started plan 0 at 8am all week the display would be 'TTB 0:7(WEK) 08:00:00 1 0'. Using this command it is possible to change the day code, the whole time or the two operation codes in one command, i.e. TTB N = <Day Code>↵, or TTB N = <Hours> <Minutes> <Seconds>↵, or TTB N = <Operation Code> <Additional Operation Code Parameter>↵	2
TSW	TSW <Entry 0 to 63> <Second Index 0 to 5> : <Value 0 to 255> **T**ime-**SW**itch settings contain 64 'timetable' entries numbered 0 to 63, identified by an 'N' in the following descriptions. Each entry consists of 6 items that are described below. If any of the items are out of range, the controller ignores the whole timetable entry. Note: If no time-switch events are specified for the current day, the last event on the previous day will continue to run. For example, the controller will still be running plan 1 today if plan 1 was the last plan called for yesterday and there are no time-switch events specified for today. The controller will not revert to 'isolated' unless a specific time-switch entry to 'isolate' the controller is specified for today.	2

	DESCRIPTION AND REMARKS	
TSW **(CONT)**	**TSW N 0 : <Day Code> (<Abbreviation>)** This first item specifies on which day or days the timetable event applies. Day Codes 0 to 15 specify a normal day or normal days of the week, e.g. '`TSW N 0:3 (TUE)`' since code 3 is usually configured to mean just on Tuesdays, see TDY. Day Codes 16 to 99 are 'Special Days' see TSD (page 94). If 'Special Holiday Periods' are configured using TSH (page 93) then: Day Codes 0 to 15 only run outside these holiday periods. Day Codes 100 to 115 only run within these holiday periods. Day Codes 200 to 215 run regardless of holiday periods. **TSW N 1 : <0 to 23 hours>** **TSW N 2 : <0 to 59 minutes>** **TSW N 3 : <0 to 59 seconds>** The above items specify at which time the timetable event applies. **TSW N 4 : <Operation Code 0 to 4>** **TSW N 5 : <Additional Operation Code Parameter>** These last two items specify the operation that should be carried out. The valid Operation Codes are described on the following page…	

	DESCRIPTION AND REMARKS	
TSW **(CONT)**	Timetable Operation Codes: **TSW N 4 : 0** TSW N 5 : <Don't Care> The operation code '0' tells the controller to isolate, i.e. drop out of CLF (cableless link facility) mode, returning to VA mode for example. **TSW N 4 : 1** TSW N 5 : <CLF Plan Number 0 to 15> The operation code '1' tells the controller to start the CLF plan specified by 'TSW N 5'. **TSW N 4 : 2** TSW N 5 : <Time-Switch Parameter Number 0 to 31> The operation code '2' tells the controller to select the time-switch parameter specified by 'TSW N 5'. **TSW N 4 : 3** TSW N 5 : <Time-Switch Event Number 0 to 31> The operation code '3' tells the controller to introduce the time-switch event specified by 'TSW N 5', without affecting any other time-switches. Note that when introducing time-switch events such as maximum green or DFM timesets, the controller automatically cancels the previous alternate time-switch; i.e. if timeset B was running when timeset C was introduced, time-switch for timeset B will automatically be cancelled. **TSW N 4 : 4** TSW N 5 : <Time-Switch Event Number 0 to 31> The operation code '4' tells the controller to cancel (i.e. 'clear' or 'reset') the time-switch event specified by 'TSW N 5', without affecting any other time-switches. Note: If the time-switch event to be cancelled is a maximum green or DFM timeset, the controller automatically cancels whichever timeset event is active. Therefore, to revert to timeset A, the timetable entry can request to cancel the event for the first alternate timeset, i.e. timeset B, even if another timeset is actually active.	

7.5 Timetable 'Holiday Clock' Commands

	DESCRIPTION AND REMARKS	
TSH	TSH <Entry 0 to 31> <0=Start / 1=End> : <Date DDMMMYY>	2

The **T**imetable **S**pecial **H**oliday table defines up to 32 periods between the specified start and end dates (inclusive) where different time-switch events are executed, e.g. during school holidays.

For example: `TSH 0 0:30-MAR-07`

and `TSH 0 1:10-APR-07`

These define a period from March 30th 2007 until April 10th 2007 inclusive where different time-switch events run.

Time-switch events with the normal day codes, i.e. those in the range 0 to 15 (see TDY) would not run on the days during these special holiday periods.

Add 100 to the day code in 'TSW N 0' (to give day codes in the range 100 to 115) on time-switch events that are to run only on days during these special holiday periods.

Add 200 to the day code in 'TSW N 0' (to give day codes in the range 200 to 215) on time-switch events that are to run regardless of special holiday periods.

Therefore:

Day Codes	During a Holiday Period	Outside all Holiday Periods
0 to 15	Ignored	Actioned
100 to 115	Actioned	Ignored
200 to 215	Actioned	Actioned

Notes:

Dates should be entered without the display '-' separator, for example by typing '`TSH 0 0=30MAR07↵`'.

The two digit year field is assumed to be in the range 1970 to 2069, i.e. '00' to '69' = 2000 to 2069 and '70' to '99' = 1970 to 1999.

To clear entry 'N' in the TSH table, simply enter '`TSH N 0=0↵`'.

If either the start date or the end date for an entry in TSH is invalid, or the end date precedes the start date, that entry is ignored.

	DESCRIPTION AND REMARKS	
TSD	TSD <Entry 0 to 63> : <Date DDMMMYY> <Day Code 0 to 99> The **T**imetable **S**pecial **D**ays table defines up to 64 various dates when the normal timetable events should not be run, e.g. public holidays. On the specified date, the specified day code replaces the normal day code for that day. **Day Codes Above 15** If the specified day code is not one of the normal timetable day codes in the range 0 to 15, only time-switch entries that use that exact day code number run on that date. For example '`TSD 0:25-DEC-XX 20`' would mean that only time-switch events with day code '`20`' would run on December 25th every year. **Day Codes 0 to 15** If the specified day code is one of the normal day codes that runs on just one day of the week (see TDY), the specified date is effectively turned into the specified day of the week. For example '`TSD 0:28-MAY-07 1`' specifies that 28th May 2007 (which was a Bank Holiday Monday) should actually run the timetable as though it was a Sunday (since day code 1 is normally the configured day code for Sunday). Therefore, on 28th May 2007, the controller would not run the normal time-switch events for Monday, but instead would run the normal time-switch events for Sunday, i.e. If Monday 28th May 2007 is outside all the holiday periods specified by TSH, time-switch entries with a day code of '1' (Sunday outside a holiday period), '7' (Everyday outside a holiday period), '201' (Every Sunday) or '207' (Everyday) will run. However, if Monday 28th May 2007 is within one of the holiday periods specified by TSH, time-switch entries with a day code of '101' (Sunday within a holiday period), '107' (Everyday within a holiday period), '201' (Every Sunday) or '207' (Everyday) will run. **Notes:** Dates should be entered without the '-' display separator, for example by typing '`TSD 0=28MAY07 20↵`'. The two digit year field is assumed to be in the range 1970 to 2069, i.e. '00' to '69' = 2000 to 2069 and '70' to '99' = 1970 to 1999. To clear entry 'N' in the TSD table, simply enter '`TSD N=0↵`'.	2

7.6 Cableless Link Facility (CLF) Configuration Commands

Note: The CLF facility will only be correctly synchronised to other controllers in the area if the time is set correctly. If the base time includes the date, e.g. midnight on the 1st January, the date must also be set correctly. The real time clock commands are described on page 88.

	DESCRIPTION AND REMARKS	
CYC	CYC <CLF Plan 0 to 15> : <0 to 254 seconds or 255 disables plan> **CYC**le time for the specified CLF plan, where 255 disabled the plan.	2
PLT	PLT <CLF Plan 0 to 15> <CLF Group 0 to 31> : <0 to 255 seconds> **Pl**an **T**ime for the specified CLF plan and group, i.e. the time within the cycle that this group comes into effect, where any value larger than the cycle time disables that CLF group for that plan. Note: These times are specified as an offset from the start of the CLF cycle and that each stream will run a different CLF group, governed by which stages the group affects. This also means that the CLF groups can be defined in any order. Also note that two or more CLF groups which affect the same stream should not be given the same plan time as only one of them will be actioned, i.e. ensure that each group runs for at least one second before the next group is introduced.	2
PLE	PLE <CLF Plan 0 to 15> : <0 to 254 seconds or 255 for anytime> **Pl**an **E**ntry time for the specified CLF plan, i.e. the normal point in the cycle where this plan is required to start. While the controller is waiting for this point in the cycle to arrive, it will normally revert to VA mode. The value '255' indicates that this CLF plan can start at any point in its CLF cycle.	2
PLX	PLX <CLF Plan 0 to 15> : <0 to 254 seconds or 255 for anytime> **Pl**an e**X**it time for the specified CLF plan, i.e. the normal point in the cycle where this plan is required to finish. The controller will keep running this plan while is waiting for this point in the cycle to arrive. If the plan is being terminated because a higher priority mode is requested, e.g. a hurry call or manual mode, the plan terminates immediately and the new mode is allowed. The value '255' indicates that this CLF plan can exit at any point in its CLF cycle.	2
OFF	OFF <CLF Plan 0 to 15> <Time Part 0 or 1> : <0 to 255 secs/mins> CLF **OFF**set from the base time (e.g. 2am) for the specified CLF plan. Depending on the configuration, the time may be specified in minutes and seconds, i.e. OFF <Plan> 0 : <0 to 59 seconds> OFF <Plan> 1 : <0 to 255 minutes> or just seconds, i.e. OFF <Plan> 0 : <0 to 255 seconds>	2
PLI	PLI <CLF Plan 0 to 15> : <CLF Influence Set 0 to 15> **Pl**an **I**nfluence set used by the specified CLF Plan, i.e. which CLF influence set does this plan run.	2

	DESCRIPTION AND REMARKS	
IFS	IFS <CLF Inf. Set 0 to 15> <CLF Group 0 to 31> : <Stage 0 to 31> **I**n**F**luence **S**tage, i.e. which stage (and thus which stream) does this group affect in the CLF influence set.	2
IFN	IFN <CLF Inf. Set 0 to 15> <CLF Group 0 to 31> : <Function 0 to 9> **I**nfluence **F**u**N**ction, i.e. what function does this group perform in this CLF influence set. Each function code is described below : 0 – Isolate the whole stream to unrestricted VA such that phase MAXs have no effect (IFS specifies any stage in the stream). 1 – Apply a non-demand dependent force for stage specified by IFS. 2 – Apply a demand dependent force for stage specified by IFS. 3 – Hold the current stage (IFS specifies any stage in the stream). 4 – Prevent all stage moves except to the stage specified by IFS, if demanded and providing no extensions exist for terminating phases. Functions 5 to 7 should no longer be required: 5 – Apply a further non-demand dependent force for the stage specified by IFS, in addition to the force already present. 6 – Apply a further demand dependent force for the stage specified by IFS, in addition to the force already present. 7 – Ignore groups output and continue with previous influence (IFS specifies any stage in the stream). Functions 8 and 9 apply to stand-alone pedestrian streams only: 8 – Inhibit Pedestrian Phase (IFS specifies any stage in the stream). 9 – Allow Pedestrian Phase (IFS specifies any stage in the stream).	2

7.7 Cableless Link Facility (CLF) Maintenance Commands

	DESCRIPTION AND REMARKS	
CPL	CPL : <CLF Plan 0 to 15> **C**urrent CLF **PL**an is displayed. Use RPL to request a different plan.	R
RPL	RPL : <CLF Plan 0 to 15, or 255 to request 'isolate'> **R**equested CLF **PL**an displays the plan requested by the timetable and can be used by the operator to request a different plan until the next timetable event (or CCP is used).	2
CCP	CCP : <Request (1) > **C**all **C**urrent **P**lan, i.e. when 'CCP=1' is entered, the controller re-scans the timetable and re-establishes the current CLF plan and time-switch events. Used to restore the controller back to 'normal operation' after RPL or SWS have been used for example.	2
SGT	SGT : <Request (1) > **S**ynchronise **G**roup **T**ime, i.e. reset the CLF plan back to time zero when 'SGT=1' is entered.	2
CCT	CCT : <seconds> **C**urrent **C**ycle **T**ime shows the incrementing cycle time for the CLF plan which is currently running.	R
CGR	CGR <Stream 0 to 7> : <CLF Group 0 to 31> **C**urrent CLF **GR**oup is displayed for the specified stream.	R
CGT	CGT <Stream 0 to 7> : <seconds> **C**urrent CLF **G**roup **T**ime remaining, counting down to the end of the current group, i.e. how long before the next group is due to start.	R
MTS	MTS : <Binary> **M**onitor **T**ime **S**tatus comprises an eight digit binary display in which the significance of each used bit is as follows: `MTS:00000001` – CLF mode not configured `MTS:00000010` – CLF mode disabled by special conditioning `MTS:00010000` – UTC FM (fallback mode) bit active `MTS:00100000` – No valid time, e.g. FLF 7 set `MTS:01000000` – CLF isolated `MTS:10000000` – Invalid plan called (cycle time either 0 or 255)	R

8 GENERAL TIMING COMMANDS

8.1 Fundamental Timings

	DESCRIPTION AND REMARKS	
MIN	MIN <Phase A to F2> : <0 to 255 seconds> **MIN**imum green time for the specified phase.	3
MTV	MTV <Phase A to F2> : <0 to 255 seconds> **M**inimum green **T**hreshold **V**alues, i.e. the lower limit, below which a minimum green time cannot be set.	R
CFZ	CFZ <Phase A to F2> : <List Of Phases> **C**onflicting phases (**FZ**) displays the phases that are configured to conflict with the specified phase.	R
IGN	IGN <Losing Phase> <Gaining Phase> : <0 to 199 seconds or 'NC'> The minimum **I**nter**G**ree**N** time between the first phase losing right of way and the second phase gaining right of way, or 'NC' if the phases are not conflicting. The smallest intergreen allowed between two phases is not only limited by the configured lowered limit, see ITV, but also by the red/amber time of the gaining phase. Thus the smallest intergreen to any traffic phase is normally 2 seconds. This command cannot be used to change the intergreen times between phases in stand-alone pedestrian streams, see PAR and PIT on page 102. Also see PBT, CMX, CDY and CRD on page 99 for details on the pedestrian clearance period on both intersection and stand-alone pedestrian streams.	3
ITV	ITV <Losing Phase> <Gaining Phase> : <0 to 199 seconds> **I**ntergreen **T**hreshold **V**alues, i.e. the lower limit, below which an intergreen time cannot be set.	R
RLT	RLT <Losing Phase> <Gaining Phase> : <0 to 255 seconds> **R**ed **L**amp monitoring **T**ime, i.e. the time added to the intergreen time to delay the phase gaining right of way, usually a pedestrian phase, when the phase losing right of way, usually a traffic phase, has one or more red lamps missing (only if red lamp monitoring has been enabled). Not applicable to phases in stand-alone pedestrian streams.	3
IGS	IGS : <0 to 255 seconds> **I**nter**G**reen on **S**tart-up normally specifies the delay from the end of the amber leaving period to the other phases appearing at green.	3

	DESCRIPTION AND REMARKS	
RAT	RAT <Phase A to F2> : <0 to 255 seconds> **R**ed **A**mber **T**ime for the specified phase. Note that depending on how the lamp sequence for the phase has been configured, the red amber period may not use the RAT time, i.e. it may specify 2 seconds explicitly or the phase may not have a red/amber aspect, e.g. pedestrian or green arrow phases. Also note that any intergreen times to this phase must be as long or longer than the red/amber time otherwise the value will be rejected with a range error (*R).	3
LAT	LAT <MaxSet 0 to 7> <Phase A to F2> : <0.0 to 31.8 seconds> **L**eaving **A**spect (or 'leaving amber') **T**ime for the specified phase during the specified maxset, where maxset 0 equates to maxset A and maxset 7 equates to maxset H. Note that depending on how the lamp sequence for the phase has been configured, the leaving amber period may not use the LAT time. It may specify 3 seconds explicitly, be a pedestrian phase and use 'PBT' or the phase may not have a leaving aspect at all, e.g. a green arrow.	3

8.2 Pedestrian Clearance Period

	DESCRIPTION AND REMARKS	
PBT	PBT <Phase A to F2> : <0 to 255 seconds> **P**edestrian **B**lackout **T**ime for the specified phase. Note that depending on how the lamp sequence for the phase has been configured, this period may show a flashing green man rather than blackout or PBT may not be used by the specified phase at all. For pedestrian signals with on-crossing detectors, i.e. with CMX set to a non-zero value, PBT defines the minimum clearance period after which the extendable CMX period starts. Also note that pedestrian phase may be configured to show a red-man rather than blackout during the clearance period (e.g. near-sided pedestrian signals). In this case, the minimum red clearance period will be governed by the handset command IGN if that is larger than PBT plus the vehicle red/amber time. (These values are ignored on Pelican crossings, see PIT)	3
IPX	IPX <I/O Line Number 0 to 247> : <0.0 to 31.8 seconds> **I**n**P**ut e**X**tension time for the specified input line. On-crossing detector inputs can each be given individual extension times using IPX. The clearance period that is extendable by the on-crossing detectors is controlled by the CMX handset command. Also see section 6.3 Basic I/O Commands on page 81.	3

	DESCRIPTION AND REMARKS	
CMX	CMX <Phase A to F2> : <0 to 255 seconds> **C**learance **M**a**X**imum time for the specified pedestrian phase. After the PBT minimum clearance period, the pedestrian clearance period can be extended up to the time specified by CMX by the on-crossing detectors before running a clearance delay CDY. Set CMX to zero if no on-crossing detectors are fitted and the phase will just run the fixed period determined by PBT with both the CMX and CDY periods ignored. (These values are ignored on Pelican crossings, see PIT)	3
CDY	CDY <Phase A to F2> <Change Type 0 to 1> : <0 to 3 seconds> **C**learance **D**ela**Y** for the specified pedestrian phase runs when the CMX period finishes due to either the on-crossing detectors going inactive (gap change) or because it has ran to its defined maximum (max change). If the CMX time is set to zero, i.e. no extendable period, these times are ignored. CDY p 0 – gap change delay CDY p 1 – max change delay (These values are ignored on Pelican crossings, see PIT)	3
CRD	CRD <Phase A to F2> : <0 to 3 seconds> **C**learance **R**e**D** period for the specified pedestrian phase specifies the all-red period after the black-out clearance periods PBT, CMX and CDY before any conflicting phases are allowed to appear. The CRD values are ignored if the extendable period shows red-man not blackout. For intersections, CRD specifies the minimum all-red period. If IGN is set larger than PBT plus CRD plus the vehicle red/amber time, it will govern the all-red period between the pedestrian phase and the vehicle phase, even if CMX is set to 0, i.e. no on-crossing detectors. (These values are ignored on Pelican crossings, see PIT)	3

8.3 Pedestrian and Cycle Crossing Demands

	DESCRIPTION AND REMARKS	
IPX	IPX <I/O Line Number 0 to 247> : <0.0 to 31.8 seconds> **I**n**P**ut e**X**tension time for the specified input line. Pushbutton inputs, cycle detector inputs and kerbside detector inputs can each be given individual extension times using IPX. Also see section 6.3 Basic I/O Commands on page 81.	3
PDX	PDX <Phase A to F2> : <1.0 to 5.0 seconds typically> **P**edestrian **D**emand e**X**tension. When all of the kerbside detectors are released and their IPX extension times have expired, the pedestrian demand is held for this period before being cancelled.	2
PDD	PDD <phase> : <0 to 3 seconds typically> **P**edestrian **D**emand **D**elay time delays the servicing of a push-button (or cycle demand) for the pedestrian phase to try to prevent conflicting vehicle phases terminating the instant the pushbutton is pressed, e.g. with Fixed Vehicle Periods or a Pre-Timed Max. The delay is not normally applied in VA mode, but is applied in all other modes. The delay does not delay demands from UTC 'D' bits, nor does it delay the illumination of the wait indicator. See the General Handbook for details.	2
CIL	CIL : <1 = Prevent Simultaneous Pedestrian Greens> **C**ross **I**nhibit **L**inking prevents both streams of a dual crossing appearing at pedestrian green at the same time, one will be forced to wait until the other has completed the pedestrian movement.	2
PMV	PMV : <Integer value, see below> **P**edestrian **M**o**V**ement options; each bit controls a pedestrian demand feature. The value of zero is the default and recommended value for most configurations. Consult Siemens in Poole if more information is required. Briefly, the features are: 1: Next stage decision to include demands for type 1/3 phases in current stage. 2: Don't hold stage to allow type 2/3 phases to appear in current stage. 4: Don't insert demands that force a stage change when RLM inhibits are cleared. And to disable new features included in PB801 issue 9 onwards: 8: Force optional phases in the start-up stage with no start-up demand to ROW. 16: Don't demand alternate stage if demanded phase can't appear in current stage. If two or more features are required, enter the sum. E.G. '5' enables features 1 and 4.	2

8.4 Standalone Pedestrian Stream Timings

	DESCRIPTION AND REMARKS	
PAR	PAR <stream number> <change type> : <1 to 3 seconds> The **P**edestrian **A**ll **R**ed period defines the duration of the all red period between the vehicle phase amber leaving period and the pedestrian phase appearing at green for each different change type as follows: PAR n 0 – Gap change in VA mode PAR n 1 – Max change (or extension inhibit by UTC 'SC' bit). PAR n 2 – FVP mode PAR n 3 – UTC controlled change (UTC 'PV' vehicle inhibit) PAR n 4 – Link controlled change ('PV1' local link inhibit or CLF influences 8 and 9, see IFN) Where n = stand-alone pedestrian stream number, or n! = intersection stream (values are ignored, use IGN instead) **NOTE:** It is a UK requirement that the all red time is overridden to 3 seconds if SDE or SA is configured (i.e. SDS is non-zero) and one or more SDE/SA assessors are configured on a phase in the stream.	3
PIT	PIT <stream number> <intergreen step 0 to 3> : <seconds> **P**elican **I**ntergreen **T**ime defines the intergreen period between the pelican pedestrian phase and the pelican vehicle phase on the specified stand-alone pedestrian stream: PIT n 0 – Vehicle steady red / pedestrian flashing green PIT n 1 – Vehicle flashing amber / pedestrian flashing green PIT n 2 – Vehicle flashing amber / pedestrian steady red PIT n 3 – When leaving the quiescent all-red state (if configured), the vehicle phase appears at flashing amber (with the ped. phase remaining at red) for the time specified by "PIT n 3" before appearing at green. Where n = stand-alone pedestrian stream number or n! = intersection stream (values are ignored) (These values are ignored on Puffin and Toucan crossings)	3

Note: All the other timings for stand-alone pedestrian streams are accessed using the normal handset commands, e.g.

Use 'MIN' for the phases' minimum green times (see section 8.1).
Use 'PBT' and 'CMX' for the ped' clearance period (see section 8.2).
Use 'MAX' for the vehicle maximum green time (see section 8.9).

Also see section 8.11 'UTC' and section 8.12 'Local Linking' for the commands associated with the UTC PV and local link PV1 inputs.

8.5 All-Red Extensions

	DESCRIPTION AND REMARKS	
REX	REX <Stream 0 to 7> : <0.0 to 31.8 seconds> All **R**ed **Ex**tension time for the specified stream.	2
RMX	RMX <Stream 0 to 7> : <0 to 255 seconds> All **R**ed **Ma****X**imum time for the specified stream, normally timed from the point at which the first phase is about to start its red to green sequence.	2

8.6 Phase Delays

	DESCRIPTION AND REMARKS	
DFZ	DFZ <Delay Number 0 to 119> : <Phase A to F2> **D**elay phase (abbr. '**FZ**'), i.e. the specified delay affects this phase.	2
DMF	DMF <Delay Number 0 to 119> : <Stage 0 to 31, or 255> **D**elay **M**ove **F**rom the specified stage, i.e. the specified delay only comes into affect on the move from the DMF stage to the DMT stage.	2
DMT	DMT <Delay Number 0 to 119> : <Stage 0 to 31, or 255> **D**elay **M**ove **T**o the specified stage, i.e. the specified delay only comes into affect on the move from the DMF stage to the DMT stage.	2
DPG	DPG <Delay Number 0 to 119> : <0 to 255 seconds> **D**elay **P**hase **G**reen, i.e. how long to prolong (or delay) the phase specified by DFZ on the movement from the stage specified by DMF to that specified by DMT. If the phase is leaving right of way during the stage movement defined for this delay, DPG specifies how long to keep the phase at green after the stage movement starts; i.e. it prolongs the appearance of the phase. If the phase is gaining right of way during the stage movement defined for this delay, DPG prevents it from appearing for the specified time after the stage movement starts; i.e. it delays the appearance of the phase.	2

8.7 Special Conditioning Commands

Special conditioning can be used to provide a wide range of facilities.

Refer to the work specification for details of what Special Conditioning facilities have been provided on a particular controller.

	DESCRIPTION AND REMARKS	
CDT	CDT <Timer Number 0 to 479> : <0 to 255 or 0.0 to 31.8 seconds> Special **C**on**D**itioning **T**imers.	2
CFE	CFE <Facility Number 0 to 63> : <0 (Disabled) or 1 (Enabled)> **C**onditioning **F**acility **E**nable.	3
CFF	CFF <Flag Number 0 to 1023> : <0 or 1> **C**onditioning **F**acility **F**lags.	2

The following sections describe the handset commands associated with each of the modes of the traffic controller (except CLF, which starts on page 95 in the Master Time Clock section)…

8.8 Fixed Time Mode

	DESCRIPTION AND REMARKS	
FIX	FIX <Stage 0 to 31> : <0 to 255 seconds> **FIX**ed time period for the specified stage, i.e. how long the stage should run for, excluding the intergreens, etc., during fixed time mode. **NOTE:** 'Fixed Time to Current Maximums' uses the commands MAX, MBX, etc., to govern its timings as its name suggests and 'linked fixed time' uses the command LFT.	2
FTS	FTS <Stage 0 to 31> : <Next Stage 0 to 31> **F**ixed **T**ime **S**equence for the specified stage tells the controller which stage to run next.	X
LFT	LFT <Stage Combination 0 to 31> : <0 to 255 seconds> **L**inked **F**ixed **T**ime period for the specified combination of stages on a multi-stream controller.	2

For Fixed Vehicle Period (FVP) mode, see MEX overleaf…

8.9 VA Operation Timings

	DESCRIPTION AND REMARKS	
PEV	PEV <Stream Number 0 to 7> : <Setting 0 to 2> **P**edestrian **E**nable **V**ehicle actuated (VA) mode: 0 = Fixed Vehicle Period operation (VA mode disabled) 1 = VA mode enabled (manual panel can select VA or FVP mode) 2 = VA mode enabled and requested (FVP mode disabled) This command is only available on stand-alone pedestrian streams. ***Important*** Enter 'PEV <s> = 0↵' for each stream number <s> to disable VA mode and request FVP operation if no vehicle detectors are fitted. Also see PTM which enables and disables pre-timed maximums. (This command replaces the T400 Pelican command VAD)	3
EXT	EXT <Phase A to F2> : <0.0 to 31.8 seconds> Green **EXT**ension time for the specified phase. Values are rounded up to the next even decimal; e.g. 1.5s is rounded up to 1.6s. Also see IPX below…	2
IPX	IPX <I/O Line Number 0 to 247> : <0.0 to 31.8 seconds> **I**n**P**ut e**X**tension time for the specified input line. Detectors that extend the phase green period can be assigned individual extension times using IPX, in which case the time for the phase should be configured to zero using EXT. If the EXT time is non-zero, the IPX and EXT times will be added together. Also see section 6.3 'Basic I/O Commands' on page 81.	3
MAX MBX MCX MDX	MAX <Phase A to F2> : <0 to 255 seconds> **MAX**imum vehicle green time for the specified phase. If alternate maxsets are used at different times of day, the 'MAX' command accesses the maximum green times that are used during maxset A, with the 'MBX', 'MCX' and 'MDX' times used during maxsets B, C and D respectively.	2
MEX MFX MGX MHX	MEX <Phase A to F2> : <0 to 255 seconds> On intersection streams, these commands specify the **M**a**X**imum green times for the specified phase during maxsets **E** to **H**. On a stand-alone pedestrian stream, these commands specify the fixed vehicle period when running FVP mode. The 'MEX' times are used during maxset A, with the 'MFX', 'MGX' and 'MHX' times used during maxsets B, C and D respectively.	2
PTM	PTM <Phase A to F2> : <Enabled (1) or Disabled (0)> Enables and disables **P**re-**T**imed **M**aximum on the requested vehicle phase, i.e. the maximum green timer starts when the phase gains right of way, regardless of whether there is an opposing demand present. Can be used on intersection phases as well as stand-alone pedestrian phases.	2

	DESCRIPTION AND REMARKS	
PTX	PTX <Phase A to F2> : <0 to 10 seconds typically> **P**re-**T**imed Maximum e**X**tra period for the specified vehicle phase. If the opposing demand is inserted after the normal pre-timed maximum period (see PTM and MAX) has expired, the maximum green timer is restarted with this time period. This stops the specified phase terminating the instant an opposing demand is inserted if vehicle extensions are present. Instead, the phase will remain at right of way for this period (unless the extensions cease earlier). Since this facility provides a delay between pressing the pedestrian pushbutton and the vehicle phase terminating just like normal VA mode, the PDD pedestrian demand delay time is not applied.	2
PWN	PWN <Stage 0 to 31> : <0 to 255 seconds> **P**edestrian **W**i**N**dow period runs along side the maximum green times and can be used to prevent demand dependant pedestrian phases appearing towards the end of a stage, when the maximum green times are close to expiring. Also see TYG. ***Important*** This window period is started when an opposing demand starts the maximum green timer of a phase running in the stage, except in UTC mode when it always starts at the beginning of the stage.	2

8.10 Manual Mode / Manual Panel

	DESCRIPTION AND REMARKS	
MND	MND : <Manual Disabled> **M**a**N**ual mode **D**isabled if this command is set to '1'. To enable manual mode, enter 'MND=0'.	2
STP	STP <Stage Combination 0 to 31> : <0, or 1 to 255 seconds> Manual **St**e**P**-on time for the specified stage combination. '0' means the controller remains in the stage until a new stage is requested on the manual panel. Any other value defines how long the controller should remain in the stage before automatically moving on to the next stage.	2
MPA	MPA <MPA Function 0 to 3> : <Manual Panel AUX button> **M**anual **P**anel **A**llocation of specific functions to the spare manual panel SW buttons and AUX indicators. The four functions are: MPA 0 – Dim Override – forces signals to bright when pressed. MPA 1 – Computer Control LED – lit if any UTC PV bit is active. MPA 2 – Local Link Disable – disables PV1 on all standalone streams. MPA 3 – Remote Reconnect – sets the UTC 'RR' reply bit. Use the following values to assign a function to a spare button/indicator: 'MPA n=18' SW1 button and AUX1 LED provide function 'n' 'MPA n=19' SW2 button and AUX2 LED provide function 'n' 'MPA n=5' SW3 button and AUX3 LED provide function 'n' 'MPA n=255' Function 'n' not allocated to any button or LED	3

	DESCRIPTION AND REMARKS	
LPT	LPT : <Request (0 or 1)> **L**am**P** **T**est for the manual panel cabinet alarm indicator. Entering 'LPT=1' illuminates the light for 3 seconds.	2

The following commands may be useful if a manual panel is not fitted:

CCI	CCI <Stream 0 to 7> : <UTC Active>	(see page 107)	R
LLD	LLD <Stream 0 to 7> : <1 = Disable Local Link>	(see page 108)	2
PEV	PEV <Stream Number 0 to 7> : <Setting 0 to 2>	(see page 105)	3
PHD	PHD <Phase A to F2> : <Continuous demand (1)>	(see page 76)	2
PHE	PHE <Phase A to F2> :<Continuous extension (1)>	(see page 76)	2
RDF	RDF : <Request DFM Reset (1) >	(see page 82)	2
RMR	RMR : <1 = Set the UTC RR Bit>	(see page 107)	2

8.11 UTC

	DESCRIPTION AND REMARKS	
DIT	DIT : <0 = UTC Dim Override or 1 = Local Link Dim Request> Specifies the **Di**mming **T**ype for the 'SO' input, i.e. whether this input is a UTC 'override to bright' input or a local link 'dim request' input.	2
UIE	UIE <Stream 0 to 7> : <0 to 255 seconds> **U**TC **I**nhibit **E**xtensions period for the specified stand-alone pedestrian stream defines the window time after the PV bit is de-activated during which the vehicle extensions are inhibited and the pedestrian demands are allowed. **NOTE:** Re-applying the PV bit during the window has no effect on its period, i.e. vehicle extensions are still inhibited and pedestrian demands are still serviced.	2
CCI	CCI <Stream 0 to 7> : <UTC Active> **C**omputer **C**ontrol **I**ndication for the specified stand-alone pedestrian stream shows a non-zero value while the UTC PV bit is active.	R
TOT	TOT : <Computer Control LED Operation 0 or 1> If the UTC **T**ake **O**ver **T**ype is set to '0', the computer control LED on the manual panel (see MPA 1) is only illuminated if a PV control bit is active on at least one of the stand-alone pedestrian streams. If it is set to '1', the computer control LED is illuminated when the TC/TO control bit is active, even if no PV bit is actually active.	2

	DESCRIPTION AND REMARKS	
DIT	DIT : <0 = UTC Dim Override or 1 = Local Link Dim Request> Specifies the **Di**mming **T**ype for the 'SO' input, i.e. whether this input is a UTC 'override to bright' input or a local link 'dim request' input.	2
RMR	RMR : <1 = Set the UTC RR Bit> **R**e**M**ote **R**econnect will set the UTC RR bit (if so configured) Ensure that this flag is set back to zero on leaving the site.	2
UWD	UWD : <12 - 30 (120 – 300 secs) , 255 > The **U**TC force bit **W**atch**D**og timeout period; if any UTC Force bit remains active for longer than this configured period, FLF 60 (UTCF) is set and UTC mode is disabled. UTC mode is allowed again once the force bit goes inactive. The default is 20; a timeout period of 200 seconds. The value 255 disables the check. **IMPORTANT:** The check needs to be manually disabled (using UWD=255) on controllers where MOVA is using the free-standing UTC interface.	2

8.12 Local Linking

	DESCRIPTION AND REMARKS	
DIT	DIT : <0 = UTC Dim Override or 1 = Local Link Dim Request> Specifies the **Di**mming **T**ype for the 'SO' input, i.e. whether this input is an UTC 'override to bright' input or a local link 'dim request' input.	2
LLD	LLD <Stream 0 to 7> : <1 = Disable Local Link> **L**ocal **L**ink **D**isable will disable the PV1 facility on the specified stand-alone pedestrian stream.	2
LKD	LKD <Stream 0 to 7> : <0 to 255 seconds> **L**in**K D**elay time for the specified stand-alone pedestrian stream.	2
LKW	LKW <Stream 0 to 7> : <0 to 255 seconds> **L**in**K W**indow time for the specified stand-alone pedestrian stream.	2
LKO	LKO <Stream 0 to 7> : <1 to 255 seconds, 0 = No override timer> **L**in**K O**verride time for the specified stand-alone pedestrian stream provides the facility described in MCE0125 where the pedestrian phase is allowed to appear if the PV1 signal is active for longer than the override time but no fault is logged. The override mode can be selected using LKM.	2

	DESCRIPTION AND REMARKS	
LKM	LKM 0 = 1 enables self-resetting **L**in**K** override (LKO) timer **M**ode: `LKM 0:0 -` When the override timer expires, the controller will disable the PV1 input and revert to normal operation with the pedestrian phase no longer inhibited. It will only resume PV1 control when PV1 is released and then re-asserted. `LKM 0:1 -` When the override timer expires, the controller will run the pedestrian delay and window periods and then return to PV1 operation (inhibiting the pedestrian). The override timer will then restart if required (see LKM 1). LKM 1 = 1 enables demand dependant **L**in**K** override timer **M**ode: `LKM 1:0 -` The override timer is started when both PV1 and the vehicle green are active, regardless of whether there is a demand for the pedestrian phase. `LKM 1:1 -` The override timer is started when PV1 and the vehicle green and a pedestrian demand are all active.	2
LKA	LKA <Stream 0 to 7> : <1 to 255 minutes, 0 = No fail active time> **L**in**K** **A**ctive fail time for the specified stand-alone pedestrian stream.	2
LKI	LKI <Stream 0 to 7> : <1 to 255 minutes, 0 = No fail inactive time> **L**in**K** **I**nactive fail time for the specified stand-alone pedestrian stream. The link active fail time (**LKA**) and a link inactive fail time (**LKI**) provide the facility described in MCE0145. If the PV1 input remains active or inactive for longer than these times, a fault is logged and the pedestrian phase is inhibited until the fault is cleared. A short pulse on the PV1 input will restart the link fail timers preventing them expiring but will not release PV1 control.	2

8.13 Hurry Call

	DESCRIPTION AND REMARKS	
DHC	DHC <Unit Number 0 to 7> : <0 to 255 seconds> **D**elay **H**urry **C**all; i.e. delay implementing the hurry call following activation of the input.	2
HHC	HHC <Unit Number 0 to 7> : <0 to 255 seconds> **H**old **H**urry **C**all; i.e. how long to hold the called stage.	2
PHC	PHC <Unit Number 0 to 7> : <0 to 255 seconds> **P**revent **H**urry **C**all for this period, timed from the start of the hurry call stage. Further activations of the hurry call request are ignored until after this time.	2
SHC	SHC <Unit Number 0 to 7> : <Status 0 to 3> **S**tatus of **H**urry **C**all specified, where the values indicate: 0 – Hurry call inactive 1 – Forcing hurry call stage 2 – Holding hurry call stage 3 – Timing hurry call delay	R

8.14 Priority Configuration Commands

	DESCRIPTION AND REMARKS	
PUP	PUP <Unit Number 0 to 7> <Phase A to F2> : <Yes(1) or No(0)> **P**riority **U**nit's **P**hase, i.e. displays a '1' if the phase is assigned to this priority unit, otherwise '0' is displayed.	R
PUT	PUT <Unit Number 0 to 7> : <Priority (1) or Emergency (2)> **P**riority **U**nit **T**ype, either (bus) priority or emergency vehicle.	R
PDE	PDE <Unit Number 0 to 7> <Alt Set 0 to 3*> : <Enable?> **P**riority **D**emand **E**nable, i.e. if set to zero, the priority unit is disabled during that alternate timeset.	2
PFD	PFD <Unit Number 0 to 7> : <0 to 255 seconds> The **P**riority unit's **F**irst **D**elay time	2
PSD	PSD <Unit Number 0 to 7> : <0 to 255 seconds> The **P**riority unit's **S**econd **D**elay time.	2
PSA	PSA <Unit Number 0 to 7> <Phase A to F2> : <Allow?> **P**riority **S**trategy: **A**llowed demands, i.e. if set non-zero, a VA demand for the phase is allowed when the unit is making its priority moves.	2
PSE	PSE <Unit Number 0 to 7> <Phase A to F2> : <Enforce?> **P**riority **S**trategy: **E**nforced demands, i.e. if set non-zero, a demand is introduced for the phase when the unit is making its priority moves.	2
PRI	PRI <Unit Number 0 to 7> <Alt Set 0 to 3*> : <0-1> Revertive Demands to Start Inhibit Timer if set to non-zero	2
PVI	PVI <Unit Number 0 to 7> <Alt Set 0 to 3*> : <0 to 255 seconds> **P**riority **V**ehicle **I**nhibit time for the priority unit during the alternate timeset.	2
PVE	PVE <Unit Number 0 to 7> <Alt Set 0 to 3*> : <0.0 to 31.8 seconds> **P**riority **V**ehicle **E**xtension time for the priority unit's priority phase during the alternate timeset.	2
PVM	PVM <Unit Number 0 to 7> <Alt Set 0 to 3*> : <0 to 255 seconds> **P**riority **V**ehicle **M**aximum green time for the specified priority unit's priority phase during the specified alternate timeset.	2
PRE	PRE <Unit Number 0 to 7> <Alt Set 0 to 3*> : <Reversion Enabled?> The **P**riority **R**eversion demand is **E**nabled for the specified priority unit during the specified alternate timeset.	2
PCA	PCA <Unit Number 0 to 7> <Alt Set 0 to 3*> : <0 to 255 seconds> **P**riority **C**ompensation time for phase **A** for the specified priority unit	2

	DESCRIPTION AND REMARKS	
PCB … PF2	during the specified alternate timeset. The commands PCB, PCC, PCD, to PCZ should be used to access the compensation times for phases B, C, D, to Z, and the commands PA2, PB2, PC2, to PF2 should be used to access the compensation times for phases A2, B2, C2, to F2.	
PMT	PMT <Unit Number 0 to 7> : <0 to 255 in 10 second units> **P**riority **M**onitor **T**ime for the specified priority unit in the range 0 to 2550 seconds. If the priority input is active for longer than this period, the input is ignored. For priority inputs, a priority DFM fault (FLF 18 on page 50) is set.	2
PVG	PVG <Unit Number 0 to 7> : <0 to 255 seconds> **P**riority **V**ehicle **G**ap time (or interrupt period) for the specified priority unit. This is the number of seconds that the priority input must be inactive before the controller treats the input as inactive for priority DFM purposes.	2
PDR	PDR <Unit Number 0 to 7> : <0 to 255> **P**riority **D**FM self-**R**eset enabled if set non-zero. Zero means manual reset. 1 or 255 means Automatic Reset when input goes inactive. Any other value specifies the N'th activation on which the fault will be cleared and a priority demand accepted, e.g. the value of 16 should be used to clear the fault after the 15th activation, allowing the 16th activation to demand the priority unit (TR2500A recommendation if automatic reset used).	2

	DESCRIPTION AND REMARKS	
PUI	PUI <Unit Number 0 to 7> : <00 to FF> **P**riority **U**nits **I**nhibited after the priority unit's phase has gained right of way. This command encodes the eight priority units using two hexadecimal digits, four units encoded by each digit: PUI 3:E8 In the above example, 'PUI 3:E8' means that priority unit 3 inhibits units 7, 6, 5, and 3.	2

UNITS:	7	6	5	4		3	2	1	0
0	-	-	-	-	0	-	-	-	-
1	-	-	-	YES	1	-	-	-	YES
2	-	-	YES	-	2	-	-	YES	-
3	-	-	YES	YES	3	-	-	YES	YES
4	-	YES	-	-	4	-	YES	-	-
5	-	YES	-	YES	5	-	YES	-	YES
6	-	YES	YES	-	6	-	YES	YES	-
7	-	YES	YES	YES	7	-	YES	YES	YES
8	YES	-	-	-	8	YES	-	-	-
9	YES	-	-	YES	9	YES	-	-	YES
A	YES	-	YES	-	A	YES	-	YES	-
B	YES	-	YES	YES	B	YES	-	YES	YES
C	YES	YES	-	-	C	YES	YES	-	-
D	YES	YES	-	YES	D	YES	YES	-	YES
E	YES	YES	YES	-	E	YES	YES	YES	-
F	YES	YES	YES	YES	F	YES	YES	YES	YES

Priority Alt Sets 0 runs when timeset A or E is running, set 1 when B or F, etc…

8.15 Priority Maintenance Commands

	DESCRIPTION AND REMARKS	
PVU	PVU <Unit Number 0 to 7> : <Binary> **P**riority **V**ehicle **U**nit's status for the specified priority unit where each binary bit has the following meaning if set to a '1' rather than '0': 00000001 – Minimum green Period running on Priority Phase 00000010 – VA Demand for Priority Phase or VA extensions 00000100 – Priority Demand/Revertive Demand Stored 00001000 – Priority Extension Timer Running 00010000 – Normal Max. Expired on Phase 00100000 – Priority Max. Timer Running 01000000 – Inhibit Period Timer Running 10000000 – Any Other Priority Demands Present	R

	DESCRIPTION AND REMARKS	
PVP	PVP <Phase A to F2> : <Binary> **P**riority **V**ehicle **P**hase information, i.e. the state of the specified phase where each binary bit has the following meaning if set to a '1': `00000001` – VA demand or extension timer running `00000010` – Priority demand stored or extension present `00000100` – Normal maximum timer running `00001000` – Compensation period timer running `00010000` – Priority maximum timer running `00100000` – Request for compensation for this phase `01000000` – This phase inhibited `10000000` – Priority demands present for other phases	R
PVS	PVS <Stage 0 to 31> : <Binary> **P**riority **V**ehicle **S**tage information, i.e. the state of the specified stage where each binary bit has the following meaning if set to a '1': `00000001` – At least one phase in this stage is in minimum green `00000010` – VA request active for one of the phases in this stage `00000100` – Priority request active for one of the phases in this stage `00001000` – Max. timer running for one of the phases in this stage `00010000` – Unused `00100000` – Priority max. running for one of the phases in this stage `01000000` – Compensation timer running for one of the phases… `10000000` – A priority demand exists that is not served by the phases in this stage	R

PIA	PIA : <Binary>
	
	Priority **I**nhibit timers **A**ctive. If a binary bit is set to a '1', it means that the inhibit timer for the appropriate priority unit is running, where the position of the bit identifies the units 7 to 0:-
	
	`PIA:XXXXXXXX`
	`7......0`
		R

PDS	PDS : <Binary>
	
	Priority **D**emand/extension **S**tatus. If a binary bit is set to a '1', it means that there is a priority demand or priority extension request present for the appropriate priority unit, where the position of the bit identifies the units 7 to 0:-
	
	`PDS:XXXXXXXX`
	`7......0`
		R

PIU	PIU : <Binary>
	
	Priority: **I**nhibited **U**nits. If a binary bit is set to a '1', it means that the appropriate priority unit is currently being inhibited, where the position of the bit identifies the units 7 to 0:-
	
	`PIU:XXXXXXXX`
	`7......0`
		R

9 LAMP MONITORING

Note that to keep compatibility with the T400 and the TC12 OTUs lamp monitors, most of the controller's lamp monitor handset commands still start with the letter 'K'.

9.1 Lamp Monitoring Maintenance Commands

	DESCRIPTION AND REMARKS	
KLR	KLR : <Request> **L**amp monitor **R**eset can be requested using 'KLR=1↵'. This clears all lamp faults and restarts learning on all sensors. This should not be used to clear normal lamp faults since replacing the faulty lamps should automatically clear the lamp fault log entry. To emphasise this, 'KLR=1↵' will not function if KRD (see below) should be used.	3
KML	KML : <phase/colour or sensor/aspect> <percentage learnt> **M**onitor the lamp monitor **L**earning the lamp loads. Enter 'KML=1' to initiate the auto-learn facility. Also see page 117.	3
KEV	KEV : <volts> **E**lectrical **V**olts displays the lamp supply voltage in volts. From PB801 issue 8 onwards, this reading can be calibrated on an LV Controller (ST900 or ST750). If the value displayed differs from the measured RMS voltage, enter the correct value, e.g. "KEV=230".	R

<table>
<tr><th></th><th>DESCRIPTION AND REMARKS</th><th></th></tr>
<tr><td>KES</td><td>KES <Sensor 1 to 48> : <current> <phase/colour>
Electrical Sensor displays the current being read in milliamps, and if possible, which phase and colour this applies to.
NOTE: Even if there is current passing through the sensor, the controller may decide that it is inappropriate to monitor the current at this time, e.g. while the supply voltage is out of range or the combination of aspects that are illuminated is not monitored. Prior to PB801 issue 9, “0mA” will be displayed, but from PB801 issue 9 onwards, a message such as ‘Lamps Off’ will be displayed, e.g. “KES 1:----mA LampsOff”.
<table>
<tr><th>Message</th><th>Meaning</th></tr>
<tr><td>LampsOff</td><td>Monitoring has been suspended while the lamp supply is off or very low; see the KEV handset command above.</td></tr>
<tr><td>Suspend</td><td>This sensor is configured not to monitor the pattern of aspects that are illuminated, or it is waiting to allow the switch on surge to dissipate.
Examples: Traffic red/amber, ped black-out, flashing periods, etc.</td></tr>
<tr><td>HiLoKEV</td><td>Monitoring has been suspended on this sensor while the supply voltage is too low or too high; see the KEV handset command above.</td></tr>
<tr><td>[KLE:0]</td><td>The lamp monitor is disabled; see the KLE command (page 126).</td></tr>
<tr><td>[KLT:0]</td><td>Monitoring has been disabled on this sensor; see the KLT handset command (page 124).</td></tr>
<tr><td>[RLM:0]</td><td>This sensor is on a pedestrian stream disabled by the RLM handset command, e.g. “RLM 1=0” (page 125).</td></tr>
<tr><td>NotMon</td><td>Not Monitored; Monitoring on this sensor has been disabled or is not configured correctly. Check the setting selected by the KLT handset command for example.</td></tr>
<tr><td>CLS:R+W</td><td>Monitoring with an on-board LV sensor has been suspended while both LED Red Man and Wait Signals are illuminated; see the KLT handset command (page 124).</td></tr>
</table>
On a wide display (see WID), the lamp supply voltage (in volts) and learnt load (in watts) will also be displayed. While the sensor is learning a load change or dim/bright change, the learnt load will freeze and be followed by a question mark, e.g. '150W?'.
KES <sensor>:<current> <voltage> <phase/colour>:<learnt load></td><td>R</td></tr>
<tr><td>KEL</td><td>KEL <Sensor 1 to 48> <Aspect 0 to 6> : <watts> <phase/colour>
Electrical Load displays the learnt load for each Aspect Pattern* of each sensor in watts, and if possible, which phase and colour this applies to.
Note that the load shown for fluorescent tubes and LED Signals can be much higher than the actual power taken by those signals since it is calculated assuming that the current is sinusoidal and in phase with the supply voltage.
* See section 9.2 on page 116 for information on ‘Aspect Patterns’.</td><td>R</td></tr>
<tr><td>KLD</td><td>KLD <Sensor 1 to 48> <Aspect 0 to 6> : <watts> <phase/colour>
Lamp fault Data (or Load Dropped) automatically scans through showing any active lamp faults and then displays the missing load in watts, and if possible, which phase and colour this applies to.
Entering ‘=0↵’ can be used to clear erroneous lamp faults, except those red lamps used for Red Lamp Monitoring; see section 9.5.2 on page 119.</td><td>3</td></tr>
<tr><td>KRD</td><td>KRD : <Request>
Red lamp fail Delete is used when a 2nd red lamp failure has extinguished the traffic signals. See page 120.</td><td>3</td></tr>
</table>

9.2 Sensor and Aspect Numbers

9.2.1 Sensor Numbers

The lamp monitor can be configured to use up to 48 sensors to monitor various signals attached to the controller. These sensors are numbered as follows:

ST900 (Mains) Intersection Traffic Controllers

L/S Card 4		L/S Card 3		L/S Card 2		L/S Card 1	
25	Y	17	Q	9	I	1	A
26	Z	18	R	10	J	2	B
27	A2	19	S	11	K	3	C
28	B2	20	T	12	L	4	D
29	C2	21	U	13	M	5	E
30	D2	22	V	14	N	6	F
31	E2	23	W	15	O	7	G
32	F2	24	X	16	P	8	H
45	Ext13	41	Ext9	37	Ext5	33	Ext1
46	Ext14	42	Ext10	38	Ext6	34	Ext2
47	Ext15	43	Ext11	39	Ext7	35	Ext3
48	Ext16	44	Ext12	40	Ext8	36	Ext4

ST750P

5	A
6	A
7	C
8	C
33	Ext1
34	Ext2
35	Ext3
36	Ext4
37	Ext5
38	Ext6
39	Ext7
40	Ext8

On the ST900 (Mains) intersection traffic controller, the 32 internal sensors on the lamp switch cards (numbered 1 to 32) monitor the 32 phases A to F2. Sensors 33 to 48 are general-purpose external sensors, four on each lamp switch card.

On the ST750 stand-alone pedestrian controller, the two vehicle phases A and C each have two internal sensors so that two approaches can be separately monitored. The external sensors can be configured to monitor additional approaches and the pedestrian phases.

NOTE: On the ST750ELV and ST900ELV controllers the allocation of sensors is flexible. Refer to the IC4 printout for details.

9.2.2 Aspect Patterns

Each sensor is configured with a particular monitor type that specifies the colours it should monitor. These colours are assigned aspect pattern numbers and each sensor can monitor up to 7 different aspect patterns numbered 0 to 6.

The table below shows the assignments between the aspect pattern numbers and the colours monitored for a typical 3 aspect signal, a typical 2 aspect signal with wait and a single aspect indicators such as green arrows and regulatory signs.

Aspect Pattern	3 Aspect Signal	2 Aspect Signal with Wait	Single Aspect Indicator
0	Red	Red (while waits are off)	Off
1	Green	Green	On
2	Amber	Red and Wait illuminated	-
3	Flashing Part-Time State	Flashing Part-Time State	-
4	-	-	-
5	-	-	-
6	-	(Wait Only)*	-

* The controller calculates the wait lamp faults from the ‘Red Only’ and ‘Red and Wait’ lamp fault results.

9.3 Commissioning

Powering up the controller for the first time will automatically start the lamp monitor learning the junction.

IMPORTANT: If the controller has been previously powered up in a depot with the signals switched ON, then the lamp monitor should be manually reset so it can learn the signals that are actually fitted on-street.

To be sure that each controller output has been learnt, at least 3 complete cycles should be allowed. Note: some controllers may have outputs (phases) which only appear under certain conditions. The commissioning engineer may decide to force these to appear (where possible) to ensure they are learnt before leaving the site.

Once an output has been learnt, the LMU will commence monitoring automatically.

During the learning cycle, the commissioning engineer should walk around the junction pressing any pedestrian push buttons that have wait indicators with them, and checking that there are no lamp failures already present on the junction. Any failed lamps should be replaced and the learning restarted (KLR=1).

When the lamp monitor has learnt an output, the command ‘KEL’ will display the learnt load in watts, making it easy to verify that the lamp monitor has correctly learnt the output. For example, if there are three signals heads connected to phase A, and each is fitted with standard 230V 50W halogen lamps, the expected load learnt would be somewhere around 150W, e.g.

```
KEL 1 0:155W A/Red
```

9.4 Monitoring Learning

To monitor how learning is progressing, use the ‘KML’ command.

The KML shows when the lamp monitor is learning a particular phase and colour (with the ‘percentage learnt’ incrementing accordingly).

While no lamp loads are being learnt, the command automatically cycles through the phases and colours that still have not been learnt.

The different KML displays are described below:

`KML:LMU Disabled`	Lamp monitoring has not been enabled in the configuration.
`KML:A/Red 0%`	Phase A’s Red is 0% learnt, i.e. the lamp monitor has not seen phase A red illuminated.
`KML:A/Green 50%`	Phase A’s Green is 50% learnt, i.e. the lamp monitor has learnt the current in either dim or bright but learning is not complete until the lamp monitor has learnt the current in both states.
`KML:A/Amber 25%`	Phase A’s Amber is 25% learnt, i.e. the lamp monitor has started to learn the current but the colour has not yet been illuminated for long enough.

`KML:Awaiting D/B`	The lamp monitor has finished learning all the currents in the present dim or bright state and is waiting for a change to the other state in order to complete the learning process. Also see KDP (page 75).
`KML:A/Red 100%`	The lamp monitor has completely learnt phase A's Red.
`KML:S33/A1 0%`	The external sensor number 33, aspect pattern 1 has not yet been learnt. Most configurations will be defaulted to provide spare sensors that can be used to monitor regulatory signs, which can only be learnt and monitored during bright. If no signs are fitted, the lamp monitor will happily learn zero current.
`KML:Complete`	Learning is complete; i.e. the lamp monitor has successfully learnt all of the currents of the junction. If lamp diming is required but learning is marked as complete even though no dim/bright changes have occurred, check the KDP setting (page 75).

Entering 'KML=1↵' may assist the learning process.

Warning **Use with care** –
Dim signals may be difficult for the traffic to see during daylight hours!

While KML=1 is active:

- The controller will insert artificial demands for all phases (except those configured with no demand on power-up) in an attempt to ensure that all of the aspects that the lamp monitor needs to learn do appear.

- The controller will override the solar cell and force the signals dim when all the lamps have been learnt in bright and vice versa, so that the lamp monitor can continue the learning process. This will not occur with the KDP settings 'KDP:0' and 'KDP:2' (see page 75).

- Entries are placed in the time-stamped historic rolling log to show when the lamp monitor learnt the lamp loads (see section 4.4.2).

When learning is complete, or 'KML=0↵' is entered, or KML times out after 20 minutes, the artificial demands and the override on the solar cell will cease.

9.5 Resolving Lamp Faults

9.5.1 Lamp Failures

When a lamp fault occurs, fault flag 55 is set (see page 64) and KLD indicates the missing load on which phase and colour, e.g.

```
KLD 1 0:49W A/Red
```

The rolling log also records the date and time of the failure; see section 4.4.3.

When a subsequent lamp fault on the same sensor and colour is confirmed, the load dropped value in ‘KLD’ and the rolling log will increase to show the total load dropped, e.g. from ‘A/Red 50W’ to ‘A/Red 100W’ when a second 50W lamp fails.

9.5.2 Lamp Replacements

When the failed signals are replaced, the ‘KLD’ value for the total load dropped will decrease and the new smaller value will be recorded in the rolling log. When all the failed signals have been replaced, the rolling log will show the load dropped as zero, e.g. ‘A/Red 0W’.

The lamp monitor must be given time to confirm any bulb replacement before the fault is automatically cleared from the log.

A lamp fault may not be cleared automatically if there has been a mismatch between load that has been reported as failed and the replacement load. This may occur if the current initially increased due to a transformer fault for example. The fault will also not clear automatically if the load dropped exceeds 255 watts, due to a feeder failure for example.

In these cases, it is necessary to issue a KLR=1 command to fully reset the lamp monitor and then follow the normal commissioning sequence as described in section 9.3 starting on page 117.

There is an alternative procedure that saves time but this must only be used if it is fully understood and, in the interests of safety, this requires Level-3 access and will not clear red lamp faults used for Red Lamp Monitoring. While viewing the KLD fault log entry, if the lamps can be seen to be working correctly and KEL has been checked to ensure that the lamp monitor has correctly learnt the load, the KLD fault log entry can be cleared by simply entering ‘=0↵‘.

9.5.3 Unexpected Load Increase

If a sensor confirms an unexpected increase in the load when no lamp failures have been logged, an event such as ‘A/Red+49W’ is added to the rolling log, but FLF 55 and KLD are not set.

If, for example, one lamp was not working when the lamp monitor was last reset and this lamp has only now been replaced then ‘A/Red+49W’ will be logged. In these cases, reset the lamp monitor again as instructed in section 9.3 on page 117.

If LED Signals are being monitored and all signals appeared to be working when the lamp monitor was commissioned, then it would imply that the signal is faulty and is consuming more power than before. A typical fault is when the LED Signal remains Bright when the controller switches the supply Dim. Check that the dim lamp supply (KEV) is below 160V (LV) or 30V (ELV) with a normal mains supply input. Visually inspect the signals on this phase/colour for possible damage and to ensure that the brightness of the signal changes as the controller switched between the Bright and Dim voltages. If this does not identify the faulty signal, consider swapping the individual signals with others at the site and monitor where the fault 'moves to' to identify the faulty signal.

9.6 RLM Faults

If the lamps have been extinguished, e.g. because two red lamp failures have been confirmed on a part-time or stand-alone pedestrian stream, refer to section 9.6.2.

9.6.1 RLM Faults; Signals Still Illuminated

Where the controller lamps are still illuminated, the normal lamp replacement sequence of locating and replacing the failed lamp will suffice.

'RFL=1↵' may be required to clear the red lamp monitor fault (FLF 22) if first or second red lamp failures have been configured as 'Only Cleared by Manual Reset'.

9.6.2 RLM Faults that Extinguish the Signals

When the controller has extinguished the signals on a part-time or stand-alone pedestrian stream due to a second red lamp fault, the following procedure should be used…

1) Check the fault log (KLD) for entries and replace any lamps in the red aspects that are faulty.

2) Enter 'KRD=1↵' to temporarily remove the second red lamp fault. In effect this tells the lamp monitor to 'forget' that it confirmed the second red lamp fault and re-instate the previous learnt load and fault status, e.g. just a single missing lamp.

   Important If the fault was detected while the controller was still initially learning the junction, also enter 'KLR=1↵' to reset the lamp monitor and restart learning.

   KRD=1 can also be achieved by simply holding down the level 3 push-button for 10 seconds if no handset is available.

3) The lamps should switch on and perform the normal start-up sequence and, providing that there are not two red lamps missing anymore, remain on.

4) Check that all red lamps are operating correctly.

The second red lamp faults will be re-instated and the signals extinguished three minutes after entering 'KRD=1↵' if the reds are not illuminated within this time.

If the extinguished stream or streams do not start-up automatically, this may be due to one or more of the following. Note that the controller will probably be configured to run a standard 7-second blackout period before illuminating the lights starting with the amber leaving period.

a) A part-time controller may remain blacked-out in part-time mode due to the time of day.

b) 'RFL=1↵' may be required to clear the red lamp monitor fault (FLF 22) if the second red lamp failure has been configured as 'Only Cleared by Manual Reset'.

c) The controller's power may need to be switched off and back on because it cannot restart the stream due to the way it has been configured, e.g. not all the phases in the stream are blacked-out.

9.7 Simulating Lamp Loads

If it is required to run a controller configured for red lamp monitoring without lamp loads, the lamp supply should be switched OFF on the manual panel before entering 'KLR=1↵' to reset the lamp monitor and 'RFL=1↵' to clear the RLM faults. This allows the controller to run with the signals switched off.

Alternatively, the controller can simulate lamp loads ***with the signals switched on***. Entering the Level-3 'SLA' access code will attempt to start the lamp load simulator facility.

This access code will immediately be cleared back to zero and no simulated lamp loads will be introduced if any of the following conditions are true:

- If the lamp monitor is not enabled.
- If the lamp monitor has failed.
- If any sensor has learnt a load higher than its configured threshold.

Once the simulated lamp loads are running, the access code will be automatically cleared, terminating the simulation, when any of the following events occur:

- Any sensor detects a real current.
- The power is switched off for more than 60 seconds.

These checks ensure that the simulated lamp loads are never used on the street where real lamps have been connected.

When the simulation starts, the lamp monitor is automatically reset so that the new simulated loads can be learnt and any old lamp faults are cleared. Similarly, when the simulation ends, the lamp monitor is again reset.

The 'Simulated Lamp Loads' can be changed using the handset command 'SLL' (also Level-3). For mains (LV) working, each phase and colour will initially have a simulated load of 200W, which can then be reduced to150W to simulate a lamp fault using this handset command. The default for ELV is 40W to simulate four 10W signals.

	DESCRIPTION AND REMARKS	
SLA	SLA : <Access Code> **S**imulated **L**amps **A**ccess is used to enter the access code that starts the simulated lamp loads facility. If the display returns to 'SLA:0', the facility has refused to start, either because lamp monitoring is not enabled or because real lamp loads are connected.	3
SLL	SLL <Phase A to F2> <Colour 'R', 'A', or 'G'> : <0 to 255 watts> **S**imulated **L**amp **L**oad for the specified phase and colour. The default value and display format depend on the controller type: SLL A R:200W .....KLV:0-1 (Mains controllers) SLL A R:4.0 .....KLV:2 (ELV controllers; all LED) SLL A R:200W (4.0) .....KLV:3-6 (Refer to page 123) From PB801 issue 7 onwards: • Simply enter '=1' to simulate one lamp load, or '=2' for two, etc. Since the default load is 4 lamps, enter '=3' to simulate one failure. • To simulate a specific number of watts, enter '=5W' for example. • For LED signals, the facility creates a simulated current based on the KLT load type, e.g. 10W for each LED signal. • On ELV controllers, the display shows the number of signals being simulated rather than the number of watts, e.g. 'SLL A R:4.0'. • On LV controllers with LED signals (KLV>2 and KLT≠255) the facility assumes '200W' still requires just four signals so it displays 'SLL A R:200W (4.0)' and simulates a load of just 40W. Prior to issue 7, the display shows 200 (for LV) or 40 (for ELV) so enter '=150' or '=30' to simulate one lamp failure for example.	3

9.8 Lamp Monitoring Configuration Commands

	DESCRIPTION AND REMARKS	
KLC	KLC : <1 to 255 seconds> **L**amp **C**onfirm time defines the number of seconds of illumination over which the Lamp Monitor confirms any lamp failure or replacement. **NOTE:** For Red Lamp Monitoring, see the handset command 'RLS' on page 123.	2

	DESCRIPTION AND REMARKS	
RLS	RLS : <0=Slow, 1=Special, 2=Fast if 2 or less lamps, …> Defines the first Red Lamp Speed (confirmation time) setting. The 'slow' confirmation time defaults to 3 seconds and 'fast' is fixed at <500ms. Red Lamp Monitoring is a compromise between finding lamp faults quickly to ensure safe operation of the traffic signals and not reporting spurious lamp faults, which could cause the signals to be extinguished or pedestrian phases to be inhibited inappropriately. Therefore, to improve the robustness of the Controller, the speed at which a first red lamp fault is confirmed can be adjusted. This setting only applies to first red lamp faults on Intersection streams. The following red lamp faults are always confirmed quickly: • First red lamp faults on stand alone pedestrian streams. • Second red lamp faults on any type of Controller. • 'Feeder failures' on any type of Controller. The settings are: **RLS:0 – 'Slow Always' (default)** **RLS:1 – 'Special'** The first red lamp fault will be confirmed quickly if it initially appears that two (or more) lamps have failed simultaneously. Otherwise, the fault is confirmed slowly (as RLS:0). **RLS:2 – 'Fast if only 2 lamps fitted'** The speed that a first red lamp fault is confirmed on a particular red aspect depends on the number of red lamps fitted on that red. A first red lamp fault will be confirmed quickly if only 2 lamps are fitted. If more lamps are fitted, the lamp monitor will be more cautious when confirming the first red lamp fault. **RLS:N (where 2<N<9) – 'Fast if only N lamps fitted'** As for RLS:2, except the lamp fault is confirmed quickly if 'N' lamps or less are fitted. For example, RLS:4 means fast if 4 or less, slow if more than 4. **RLS:9 – 'Fast always'.**	
KLV	KLV : <Lamp Supply Voltage Type: 0 to 8> The configured **L**amp Supply **V**oltage Type. This single value configures the whole controller to expect signals of a particular type. The following table shows the options available.	3

Value	Description
KLV:0	200-240V (incandescent)
KLV:1	100-120V (incandescent)
KLV:2	48V (ST900ELV & ST750ELV only)
KLV=3	230V Siemens/Dialight 'Helios CLS (NLM)' Traffic
KLV=4	230V Siemens/Dialight 'Helios CLS (NLM)' Traffic and Ped***
KLV=5	230V Siemens/Futurit 'Helios CLS (NLM)' Traffic
KLV=6	230V Siemens/Futurit 'Helios CLS (NLM)' Traffic and Ped***
KLV=7	230V Siemens SILUX 1.230d Traffic
KLV=8	230V Siemens SILUX 1.230d Traffic and Ped***

*** See the KLT command for the differences between KLV=3 and KLV=4 (etc.).

Changing the value will result in a lamp monitor reset and relearn.

'KLV:2' is specific to the ST900ELV and ST750ELV Controllers.

If the command KLV=3 (or higher) is used, always review all the KLT settings afterwards and refer to the handbook 667/HB/32921/007.

Note: 'Incandescent' includes fluorescent tubes as well as LED signals that simulate an incandescent lamp load, e.g. 'Helios CLS+LMF' and 'Helios LED' Signals.

DESCRIPTION AND REMARKS

KLT

KLT <Sensor 1 to 48> : <Load type 0-255> 3

Load **T**ype for each lamp monitor sensor.

All these values are set up by IC4, or may be changed if KLV=3 (or higher) is entered, and can be viewed and modified using this handset command. Changing a KLT value will result in the fault “FLF 56:255 LMUC” being set to act as a warning. This fault will be cleared when a lamp monitor reset and relearn is requested using KLR=1.

The currently defined types are shown in this table. The types available depend on the controller type (ELV or LV), the firmware issue and the version of the LED Signal; refer to the handbook 667/SU/32900/000 for version compatibility information.

Note: Prior to PB801 issue 7, this value was ignored on an ST900 (LV) Controller.

KLT	ELV	LV	Signal Types
0	✓	✓	Monitoring Disabled
1	✓	×	Siemens Helios ELV
	×	✓	Siemens / Dialight Helios CLS (NLM) *
2	✓	×	Siemens LED Demand Indicator
3	✓	×	Siemens LED Near-Side Puffin, Toucan, etc.
4	✓	×	Siemens ELV LED Reg. Sign
5	✓	×	Siemens LED Wait
6	✓	×	AGD LED Near-Side Pedestrian (etc.)
7	✓	×	AGD LED Demand Indicator
8	✓	×	Siemens LED Low-Power Near-Side Puffin, Toucan, etc.
10	×	✓	Siemens / Futurit Helios CLS (NLM) *
11	×	✓	230V Siemens SILUX 1.230d LED Signals
255	×	✓	Original **

✓ Refer to the handbook 667/SU/32900/000 for version compatibility information.

× Monitoring of these signal types on this controller type is not possible.

* These values are for Helios CLS (with No LMF Module) using KLV=3 (or higher) and an “LED Lamp Switch” PCB; see the handbook 667/HB/32921/007 for more details.

** ‘Original’ includes HI lamps, Helios LED, Helios CLS+LMF and fluorescent tubes. Only this Load Type uses the IC4 configured ‘Bulb Watts’ value.

*** If an on-board sensor is configured to monitor pedestrian Red and Wait with an “LED Lamp Switch” PCB, the following applies:

- The 'KLT s:255' option allows the controller to monitor two incandescent Pedestrian Red Man Signals and two 40/60W Wait lamps. This is the default when KLV = 3, 5 or 7 is entered on an ST900LED Controller.
- The ‘KLT s:0’ option disables monitoring of the pedestrian phase. This is the default when KLV = 3, 5 or 7 is entered on an ST750LED Controller.
- With other KLT values, monitoring of the Pedestrian Red LED Signals will only occur while the Waits are OFF and monitoring of the Waits will be disabled allowing LED Waits to be fitted. KES will display "CLS:R+W" while both the Red and Wait signals are illuminated. This is the default when KLV = 4, 6 or 8 is entered.

For all other sensor types, the setting applies to all colours monitored by that sensor.

IMPORTANT: All signals monitored by a particular sensor must be of the same type, i.e. require the same KLT value. Do not fit different signal types on the same sensor.

On a wide screen terminal device (see WID), this command also shows the phase and colours monitored by this sensor.

	DESCRIPTION AND REMARKS	
ELV	ELV : <0 (None), 1 (Waits), 2 (All Ped Signals)> Defines the ELV (Extra Low Voltage) setting on the ST750 pedestrian traffic controller, which has the ability to drive the pedestrian waits or all the pedestrian signals at the 'extra low voltage' of 48v rms (nominally). This setting is not used on the other types of controller. ELV:0 – All signals are driven at the normal mains lamp supply from the controller (even if external transformers are used to actually drive the lamps) ELV:1 – The controller is driving the wait lamps directly at 48V AC. ELV:2 – The controller is driving all the pedestrian signals (red, green and wait on phases B and D) at 48V AC, e.g. near-side signals* As well as changing the links and fuses on the ST750 power distribution and lamp switch card (as described on its heat-sink), the firmware also needs to be informed of the required setting. The lamp monitor will be automatically reset when the ELV setting is changed so it is ready to learn the lamp loads correctly. * The ST750 is currently unable to lamp monitor LED Near-Side Signals. On other controllers, the 'ELV' handset command is read-only and (from PB801 issue 7 onwards) responds with: ELV:NO.....ST900 ELV:YES.....ST750ELV and ST900ELV [Prior to PB801 issue 7, the display would always show ELV:0 on these controllers]	3
RLM	RLM <Stream 0 to 7> : <Number Of RLM Channels 0 to 4> Defines the number of **R**ed **L**amp **M**onitored channels on each stand-alone pedestrian stream, i.e. the number of lamp monitor sensors that perform Red Lamp Monitoring on the vehicle phase of that stream. '`RLM 0:2`' and '`RLM 1:2`' – Dual controller each with two channels. '`RLM 0:4`' and '`RLM 1:0`' – Single controller with four channels. This command is only available on stand-alone pedestrian streams and will only be accepted if the Signals On/Off Switch is in the OFF position. If the 'RLM' command is used to change the number of channels, the lamp monitor will be automatically reset in order to clear any old lamp faults and make it ready to learn the new lamp loads when the signals are switched back on. If the number of red lamp monitor channels is reduced, the sensors that are no longer used for red lamp monitoring will still perform normal lamp monitoring if loads are connected. So that the sensors performing red lamp monitoring can be easily identified, commands such as KEL will show the monitored colour as 'RLMRed' rather than 'Red'. From PB801 issue 11 onwards, if a sensor is disabled by the KLT command, the number of channels shown by the RLM command will be reduced accordingly. If 'RLM 1=0↵' is entered on a dual controller to set the number of RLM channels on the second stream to zero, the second stream is extinguished, but no fault is raised. This allows a dual configuration to be converted in to a single.	3

9.9 Miscellaneous LMU Commands

The following Lamp Monitoring handset commands are also available, but should not be needed during normal commissioning or maintenance operations.

	DESCRIPTION AND REMARKS	
KLE	KLE : <Enabled (1) or Disabled (0)> **L**amp monitoring **E**nabled indicates whether the lamp monitor has been enabled or disabled. **CAUTION:** Disabling the lamp monitor will generate second red lamp failures if red lamp monitoring is configured and thus may extinguish all the signals on the street. If the handset responds with '`*I`', the Lamp Monitoring facility may have been disabled by the PLD.	3
KAS	KAS <Sensor 1 to 51> <Aspect 0 to 6> : <Binary> **A**spect **S**tatus for the sensor and aspect. Each bit set to '1' signifies: `00000001` – Waiting to learn the aspect in the dimmed state `00000010` – Waiting to learn the aspect in the bright state `00000100` – Waiting to see the aspect for the first time `00001000` – Waiting for a dim/bright change-over `00010000` – Confirming a load change (or initial learning) `00100000` – Confirming a dim/bright change	R
KLS	KLS : <Binary> **L**earn **S**tatus displays the overall learnt status, i.e. the combined display from all the KAS displays (right most 4 bits only).	R
KLM	KLM : <State 6, 7 or 8> **L**a**M**p state shows the lamp supply state confirmed by the lamp monitor, where 6=lamps off, 7=lamps on, and 8=change being confirmed.	R
KTE	KTE : <Options 0 to 5> **T**race **E**nable controls whether diagnostic trace records (see KTR) are recorded. This facility was added in PB801 issue 6. The following options are available. KTE=0 – No trace records are created; logging disabled. KTE=1 – Trace records are always created; permanent enable. KTE=3 (default) – Trace records are created until any lamp failure is confirmed so that the operation of the lamp monitor just prior to the failure is captured. Logging is suspended while any lamp fault is present. The logging resumes when the lamp fault is cleared. KTE=5 – Same as KTE=3, except that logging does not resume when the fault is cleared to help investigate intermittent faults for example.	2

	DESCRIPTION AND REMARKS	

KTR	KTR <Sensor 1 to 48> <Record 0 to 49> : <Information>
	A new record is created for a sensor whenever the current, learnt load or phase/colour (aspect number) changes significantly.
	Each **T**race **R**ecord shows the following information, with an example below.
	`KTR ss rr:Aa *day hh:mm:ss iiiimA vvvV wwwwxy P/Col`
	`KTR 2 0:A0 *Mon 12:00:00 1124mA 240V 270WB? B/Red`
	The content of each shaded 'field' is described below.
	`Ss` ..... Sensor number. The records for each sensor are kept separate. Type "KTR 2↵" to start viewing the records for sensor 2 for example.
	`Rr` ..... Record number. Information is first stored in record 0, then record 1, etc. When record 49 has been used, the contents of record 0 (etc.) are overwritten with more recent data. To get the whole history for a sensor, scroll through all 50 (0-49) records and then use the timestamp fields (or asterisk if available) to locate the most recent record.
	A`a` ..... Aspect Pattern number being monitored by the sensor, i.e. the colour being monitored. Refer to section 9.2 for more information.
	`*` ..... An asterisk marks the most recent record [NB1].
	`day` `hh:mm:ss`…The day of the week [NB1] and time of day when the record was created.
	`Suspended, KTE:n`…If this is logged instead of the following measurements, logging was suspended by the KTE value, e.g. while a lamp fault is logged [NB1].
	`i`mA... The current measured in milliamps (see KES).
	`v`V ..... The lamp supply measured in volts (see KEV) [NB2].
	`w`W ..... The learnt load in watts (see KEL).
	`x` ..... The Dim/Bright learnt state. "WD" or "WB" indicates that the learnt load was learnt in either Dim or Bright as appropriate. "W?" indicates that the dim/bright state has not yet been confirmed.
	`y` ..... This flag displays '?' while the controller is learning or confirming any change (see KAS), e.g. "100WB?" indicates that the controller had learnt the load as 100W in Bright, but is currently confirming a change. When the change is confirmed, a new record will be created showing the new learnt load.
	`P/Col`…Displays the phase and colour monitored by the sensor and aspect pattern (if applicable).
	NB1: The features '*', 'day' and 'Suspended' were added in PB801 issue 11.
	NB2: ELV voltages may be displayed without a decimal point, e.g. "481V" for 48.1V.
		R

10 ON-STREET CONFIGURATION

10.1 General Description

If enabled by the configuration PROM, this facility allows the engineer on the street to configure simple junctions.

Using handset commands detailed later in this section, the engineer can alter fundamental items such as the number of phases, the phase types, the number of stages and which phases appear in each stage.

When a controller configured with this facility is first powered-up, it will not illuminate the signals, but wait to be configured.

A second access code must be entered before any on-street configuration commands can be used. This command is ‘SAC’ and is a level 3 command that can only be entered if the signals’ off/on switch is in the ‘off’ position.

The controller can then be configured using the on-street configuration commands as well as all the normal handset commands, e.g. ‘MIN’, ‘MAX’, etc.

When the controller has been configured, the command ‘CFG’ should be entered and the power switched off and back on.

The configuration can then be checked with the signals initially still switched off.

To modify the configuration, switch off the signals using the signals on/off switch on the manual panel and enter the ‘SAC’ command again. This will automatically reboot the controller back into on-street configuration mode.

To restart the controller running the modified configuration, the ‘CFG’ command should be entered again and the power switched off and back on.

The correct numeric codes for ‘SAC’ and ‘CFG’ will be supplied separately to each user on request.

10.2 On-Street Configuration Commands

	DESCRIPTION AND REMARKS	
SAC	SAC : <Access Code> On-**S**treet Configuration's **A**ccess **C**ode, see description on the previous page.	3
CFG	CFG : <Access Code> 'On-Street **C**on**F**i**G**uration complete' command, see description on the previous page.	X
FAZ	FAZ : <1 to 26 phases> Number of phases, including any dummy phases. Note: the maximum number of phases that can be configured is limited by the number of phases initially configured in the original configuration.	X
STG	STG : <2 to 32 stages> Number of **St**a**G**es, including any all-red stages.	X
FZT	FZT <Phase A to F2> : <Lamp Sequence Set 0 to 7> Phase (**FZ**) **T**ype, i.e. the lamp sequence set used by each phase.	X
TYG	TYG <Gaining Types 1, 2 or 3> : <Phases> Different **Ty**pes of **G**aining right of way i.e. which optional phases are assigned to the three types of gaining right of way. For example, 'TYG 1:CDE' indicates that phases C, D and E are configured as 'type 1', i.e. appear in the stage only if a demand was present when the controller started the stage to stage move. Type 2 phases will appear when a demand is detected at any point during the stage. Type 3 phases are similar to type 2 phases, except the phase will not appear if the window time for the stage has expired (also see PWN)	X
FZA	FZA <Phase A to F2> : <Phase A to F2> Phase (**FZ**) **A**ssociated with the specified phase. See FZL.	X
FZL	FZL <Phase A to F2> : <Leaving Type 0, 1 or 2> Phase (**FZ**) **L**eaving type, i.e. the leaving type of the specified phase. Leaving Type 0 is the normal leaving type; i.e. the phase leaves right of way when the stage finishes. Leaving Types 1 and 2 are normally only used for green arrows, so that the green arrow extinguishes when the associated phase, see FZA, gains (type 1) or leaves (type 2) right of way.	X
Tip!	These commands can be used on any controller, not just those with the facility enabled, to view this normally read-only information.	

	DESCRIPTION AND REMARKS	
FFZ	FFZ <Stage 0 to 31> : <Phases> **F**ixed phases (**FZ**) in the specified stage.	X
OFZ	OFZ <Stage 0 to 31> : <Phases> All the phases in the specified stage including **O**ptional phases.	X
IGN	IGN <Phase> <Phase> : <Seconds or 'NC'> **I**nter**G**ree**N** time from one phase to the next. For on-street configuration, this command has been enhanced so that the engineer can also enter '`IGN A B=NC↵`', for example, to make phases A and B non-conflicting.	X
AM1	AM1 <Stage 0 to 31> <Stage 0 to 31> : <Stage or 200, 201 or 255> **A**lternate **M**ove set **1** defines the alternative or prevented moves for the selection of modes set-up in the configuration, while 'AM2' accesses the second set of alternate moves for a different selection of modes. If the value is a stage, it specifies the required alternative move. For example, '`AM1 2 1:3`' configures the controller to move to stage 3 instead of making the move from stage 2 to 1. The value of '200' prohibits the move; i.e. the controller should not make the configured move and should not attempt to look for another other stage movements. The value of '201' ignores the move; i.e. the controller should not make the configured move but should look for another movement. The value of '255' allows the stage movement.	X
AM2	AM2 <Stage 0 to 31> <Stage 0 to 31> : <Stage or 200, 201 or 255> **A**lternate **M**ove set **2** is similar to 'AM1', except that it accesses set 2; i.e. is used by a different set of modes.	X
FTS	FTS <Stage 0 to 31> : <Next Stage 0 to 31> **F**ixed **T**ime **S**equence for the specified stage specifies the required next stage when the controller is running Fixed Time mode.	X
AFZ	AFZ : <Phases> **A**rterial reversion: the phase or phases (**FZ**) demanded in the absence of any other demands at the junction.	X
AST	AST <Stream> : <Stage 0 to 31> **A**rterial reversion: the **St**age demanded in the absence of any other demands at the junction.	X
Tip!	These commands can be used on any controller, not just those with the facility enabled, to view this normally read-only information.	

11 DELETED / REDUNDANT FACILITIES AND COMMANDS

This section describes why certain T400 handset commands have been deleted and which new commands have replaced them, as well as those commands which should not be required any more, but have been kept for backwards compatibility.

11.1 Old T400 Pelican Handset Commands

	DESCRIPTION AND REMARKS	
~~FIO~~	FIO <Index 0 to 139> : <I/O Line 0 to 95 or 255(disable)> The **F**unction **I**nput/**O**utput allocation command – use IOA (section 6.2)	2
~~FVA~~	FVA <Stream 0 to 3> : <20 to 60 seconds> **F**ixed **V**ehicle Period Time Sets **A** to **D** – use MEX etc. (section 8.9)	2
~~HKD~~	HKD <Stream 0 to 3> : <1.0 to 2.0 seconds> **H**old **K**erbside **D**etector handset command – use IPX (section 8.3)	2
~~HPB~~	HPB <Stream 0 to 3> : <1.0 to 2.0 seconds> **H**old **P**ush **B**utton handset command – use IPX (section 8.3)	2
~~PGT~~	PGT <Stream 0 to 3> : <3 to 15 seconds> **P**edestrian **G**reen **T**ime handset command – use MIN as normal.	3
~~SAS~~	SAS < Stream 0 to 3> : <No. of SDE/SA assessors being used 0 to 15> Number of **S**DE/SA **As**sessors – see section 6.7.	3
~~VAD~~	VAD <Stream 0 to 3> : <0 to 4> **VA** mode **D**isable – use PEV and PTM (section 8.9)	3
~~VAE~~	VAE <Stream 0 to 3> : <0 to 4seconds> Pelican **VA** Green **E**xtension time – use EXT or IPX (section 8.9)	2
~~VAM~~	VAM <Stream 0 to 3> : <6 to 15> Pelican **VA** Green **M**inimum time – use MIN as normal.	3
~~VAX~~	VAX <Stream 0 to 3> : <10 to 60 seconds> Pelican **VA** Green Ma**X**imum time – use MAX as normal (section 8.9)	2
~~WTI~~	WTI <Demand Source 0 to 4> : <Value 0 to 1> Deleted. Special conditioning is required if the wait indicator should not be illuminated with certain demand sources.	2

11.2 Old Fault Log Commands

	DESCRIPTION AND REMARKS	
FLF	FLF <Fault Flag 0 to 63> : <Value 0 to 255> View the specified **F**ault **L**og **F**lag. Normal response would be a value of zero for no fault, or a number other than zero when a fault is present. The commands FLF and FLD have been effectively replaced by FFS and FDS; see section 4 starting on page 30.	R
FLD	FLD <Fault Data 0 to 249> : <Value 00000000 to 11111111> View the specified **F**ault **L**og **D**ata byte; see FLF above.	R
FLT	FLT <Fault Flag 0 to 63> : <Time, Day and Week Number> **F**au**L**t **T**ime displays the time of day of when the specified fault flag was last set (even if it has subsequently been cleared). The time that faults became set is also recorded in the historic rolling log making this command virtually redundant.	R

11.3 Old Master Time Clock Commands

	DESCRIPTION AND REMARKS	
STM	STM 0 : <0 (Sat) to 6 (Fri)> STM 1 : <0 to 23 hours> STM 2 : <0 to 59 minutes> STM 3 : <0 to 59 seconds> STM 4 : <1 to 31 day of month, or 0> STM 5 : <1 to 12 month number, or 0> STM 6 : <0 to 99 year> **S**et **T**i**M**e can still be used on the controller to set-up the time and day of week before entering 'CKL=1' as on the T400, although it is much easier to simply enter the date and time directly using TOD, see page 88. STM has been extended to also allow the date to be set-up. However, if either the 'day of month' or the 'month' fields are '0', the date is not changed in case the operator failed to notice these extra entries.	2
CKL	CKL : <1> Request **C**loc**K** **L**oad can still be used with STM to set the clock, although it is much easier to simply enter the date and time directly using TOD, see page 88.	2
DAY	DAY : <0 to 6> Views the controller's current **DAY** of week value. TOD now displays the time, the date and the day of the week.	R

11.4 Old Cableless Link Facility Commands

	DESCRIPTION AND REMARKS	
~~IFA~~ to ~~IFD~~	IFA <CLF Inf. Set 0 to 7> <CLF Group 0 to 31> : <Function & Stage> The four T400 influence sets IFA to IFD are no longer provided. The controller now automatically determines which IFN influences affect which streams from the IFS value.	2
~~PRS~~	PRS : <Enable (1) or Disable (0) Automatic **P**lan **R**e-entry **S**witch allowed the CLF group times to be altered and then, after the delay set by PRD had expired automatically, re-introduced the current plan. Since group times now specify offsets in a separately configured cycle time, there is no need for this facility and thus these two commands have been deleted.	2
~~PRD~~	PRD <Time Part 0 to 1> : <0 to 255 seconds/minutes> Deleted, see PRS.	2

11.5 Old Timing Commands

	DESCRIPTION AND REMARKS	
AMX	AMX <Phase A to F2> : <0 to 255 seconds> **A**lternate **M**a**X**imum green time accesses the same information as MBX.	2
~~DMV~~	DMV <Delay Number 0 to 59> : <00 to FF – Stage Movement> Phase **D**elay **M**o**V**ement commands had to be modified to allow stage numbers up to 31 to be specified – see DMF and DMT on page 103.	2
~~LMX~~	LMX <Stream 0 to 7> : <0 to 255 seconds> **L**MU **M**a**X**imum all red time was introduced by a 2nd red lamp fail pending signal from the LMU unit. Red lamp monitoring is now fully built-in and does not require a 2nd red lamp fail pending signal.	2
PIR	PIR <Timer Number 0 to 479> : <0 to 255 or 0.0 to 31.8 seconds> **P**edestrian **I**nhibit **R**elease times accesses the same information as CDT, i.e. the special conditioning timer values – see page 104.	2
~~SIE~~	SIE <Stream 0 to 7> : <0.0 to 31.8 seconds> **S**upplementary **I**ntergreen **E**xtension time defined the all red period due to 1st red lamp fail signal from the LMU unit. Red lamp monitoring is now fully built-in and uses RLT to specify delays between phases on a 1st red lamp failure.	2

11.6 Old Status Commands

	DESCRIPTION AND REMARKS	
CST	CST <Stream 0 to 7> : <0 to 31 Current Stage> Displays the **C**urrent **St**age on each stream or the next stage during a stage movement. The handset command STS displays the status of each stream, which includes displaying the current stage or the previous and next stage during a stage movement.	R
MOD	MOD <Stream 0 to 7> : <Mode Number> Displays the current operating **MOD**e on each stream as a decimal number. The handset command STS displays the status of each stream, which includes displaying the current mode as text.	R
STA	STA : <Status Information> Displays **STA**tus information on the first 16 phases and was used by a Ferranti OMU connected to the controller's 141 port.	R

11.7 Miscellaneous Commands

	DESCRIPTION AND REMARKS	
CPT	CPT : <1 to request> Request a **C**onflict **P**ROM **T**est on the next power-up – the new controllers do not have a conflict PROM.	2
DFD	DFD : <1 to 255 hours, 0 = 1 minute> **D**etector **F**ault monitoring **D**elay set the single DFM time for the old DFM facility. The new DFM facility assigns detectors to one of up to eight DFM groups and allows alternate timesets, see DSA and DSI.	2
~~KAC~~	KAC <Sensor 1 to 23> <0=current, 1=voltage> : <value> This handset command displays the ADC counts for the current or the voltage of the given sensor, replaced by KES and KEV.	R
~~KLP~~	KLP <Sensor 1 to 23> <Aspect 0 to 6> : <Text> This handset command displays lamp faults with phase information, replaced by KLD.	R

12 HANDSET COMMAND SUMMARY

This table lists all the commands available with a short description. Note: Ranges show the maximum range permitted. The actual range available may be reduced by configuration data.

O=OPEN, R=READ ONLY, 2=LEVEL 2, 3=LEVEL 3, X=ON-STREET CONFIGURATION

CODE	INDEX1	INDEX2	DATA	DESCRIPTION	⇩
ADF	-	-	1	ACCEPT DETECTOR FAULT(S)	2
AFZ	-	-	PHASES	ARTERIAL REVERSION (PHASES)	X
AM1	STAGE	STAGE	0-255	ALT MOVE SET 1 (0-31=STAGE, 200=PROHIB)	X
AM2	STAGE	STAGE	0-255	ALT MOVE SET 2 (201=IGNORE, 255=ALLOW)	X
AMX	PHASE	-	0-255	SECOND MAX PERIOD	2
AST	STR'M	-	0-31	ARTERIAL REVERSION (STAGE)	X
BAS	-	-	0-3	SELECT MEMORY DISP. BASE	2
BSA	-	-	0-52	SET BST ADVANCE WEEK	2
BSR	-	-	0-52	SET BST RETARD WEEK	2
CCI	0-7	-	-	UTC ACTIVE	R
CCP	-	-	1	RESTORE CLF OPERATION	2
CCT	-	-	-	CURRENT CLF CYCLE TIME	R
CDT	0-479	-	0-255	CONDITIONING TIMERS (MAY BE 0.0-31.8)	2
CDY	PHASE	0-1	0-3	PEDESTRIAN CLEARANCE DELAY	3
CFE	0-63	-	0-1	CONDITIONING FACILITY ENABLES	3
CFF	0-1023	-	0-1	CONDITIONING FACILITY FLAGS	2
CFG	-	-	0-255	ONSTREET CONFIGURATION COMPLETE	X
CFZ	PHASE	-	-	CONFLICTING PHASES	R
CGR	STR'M	-	-	CURRENT CLF GROUP	R
CGT	STR'M	-	-	CURRENT CLF GROUP TIME	R
CIC	-	-	-	CONFIGURATION PROM IDENTITY CODE	R
CID	-	-	VERSION	FIRMWARE VERSION DESIRED BY IC4	R
CIE	-	-	VERSION	FIRMWARE VERSION THAT FAILED TO LOAD	R
CIL	-	-	0-1	CROSS INHIBIT LINKING	2
CKA	-	-	DATE	CLOCK ADVANCE DATE (DAYLIGHT SAVING)	2
CKL	-	-	1	LOAD MASTER TIME CLOCK	2
CKM	-	-	-	GPS CLOCK MONITORING	R
CKR	-	-	DATE	CLOCK RETARD DATE (DAYLIGHT SAVING)	2
CKS	-	-	TIME	LAST GPS CLOCK SYNCHRONISATION TIME	2
CMX	PHASE	-	0-255	PEDESTRIAN CLEARANCE MAX TIME	3
CNN	-	-	0-255	CONTROLLER RESET COMMAND	3
CPL	-	-	-	CURRENT PLAN	R
CPT	-	-	-	NO CONFLICT PROM ANYMORE	-
CRC	-	-	-	EIGHT DIGIT CHECKSUM	R
CRD	PHASE	-	0-3	PEDESTRIAN CLEARANCE RED PERIOD	3
CST	STR'M	-	-	CURRENT STAGE IN STREAM	R
CTS	-	-	0-2	SELECT MST SYNC SOURCE	2
CUD	0-7	-	0-247, 255	ASSIGN U/D UNIT TO AN INPUT LINE	2
CYC	0-15	-	0-255	CLF PLAN CYCLE TIME	2
DAY	-	-	-	MASTER TIME CLOCK DAY	R
DBG	-	-	-	RESERVED FOR ENGINEERING USE ONLY	3
DCL	0-7	-	0-255	DET. CALL DELAY PERIOD	2
DCN	0-7	-	0-255	DET. CANCEL DELAY PERIOD	2
DET	0-95	-	0-2,99	DETECTOR INPUT SETTING	2
DFA	0-247	-	0-2	DETECTOR FAULT ACTION	2
DFD	-	-	-	USE DSA AND DSI	-
DFS	0-247	-	0-1	DET. FAULT MONITOR DISABLE	2
DFZ	0-119	-	PHASE	PHASE TO BE DELAYED	2
DGP	0-247	-	0-7,255	ASSIGN INPUT LINE TO A DFM GROUP	2
DHC	0-7	-	0-255	HURRY CALL DELAY PERIOD	2

O=OPEN, R=READ ONLY, 2=LEVEL 2, 3=LEVEL 3, X=ON-STREET CONFIGURATION

CODE	INDEX1	INDEX2	DATA	DESCRIPTION	⇩
DIT	-	-	0-1	DIMMING TYPE	2
DMF	0-119	-	STAGE	PHASE DELAY MOVE FROM STAGE	2
DMT	0-119	-	STAGE	PHASE DELAY MOVE TO STAGE	2
DMV	-	-	-	USE DMF/DMT	-
DOV	-	-	0-1	DIM OVERRIDE	2
DPG	0-119	-	0-255	PHASE DELAY PERIOD	2
DSA	0-7	T/SET	0-255	DFM SET ACTIVE FAILURE	2
DSF	0-247	-	-	DETECTOR STATE ON FAILURE	R
DSI	0-7	T/SET	0-255	DFM SET INACTIVE FAILURE	2
DTO	-	-	0-1	DFM TIME OVERRIDE	2
ELV	-	-	0-2	ST700 EXTRA LOW VOLTAGE SETTING	3
ENC	ADDR	-	-	DISPLAY CONFIG. PROM DATA	R
ENG	CODE	OFFS.	-	DISPLAY ENG. CODE MEMORY	R
ENM	ADDR	-	-	DISPLAY IMU SHARED MEMORY	R
ENO	ADDR	-	-	DISPLAY OTU SHARED MEMORY	R
ENR	ADDR	-	-	DISPLAY RAM MEMORY DATA	R
ENS	ADDR	-	-	DISPLAY SDE SHARED MEMORY	R
EXT	PHASE	-	0-31.8	PHASE EXTENSION PERIOD	2
FAC	0-59	-	-	FACILITIES TABLE	R
FAZ	-	-	2-32	NUMBER OF PHASES	X
FDS	0-249	-	-	FAULT DATA SCAN	R
FFS	0-63	-	-	FAULT FLAG SCAN	R
FFZ	STAGE	-	PHASES	FIXED PHASES IN THE STAGE	X
FIO	-	-	-	USE IOA	-
FIX	STAGE	-	0-255	FIXED TIME STAGE PERIOD	2
FLD	0-249	-	-	FAULT LOG DATA	R
FLF	0-63	-	-	FAULT LOG FLAG	R
FLT	0-63	-	-	FAULT LOG TIME (TIME FLAG WAS LAST SET)	R
FRE	0-2	-	0-100	FREE PROCESSOR TIME	2
FTS	STAGE	-	STAGE	FIXED TIME SEQUENCE	X
FVA-D	-	-	-	USE MEX TO MHX	-
FZA	PHASE	-	PHASE	ASSOCIATED PHASE	X
FZL	PHASE	-	0-2	PHASE LEAVING TYPE	X
FZT	PHASE	-	0-7	PHASE TYPE (I.E. WHICH LAMP SEQUENCE SET)	X
HHC	0-7	-	0-255	HURRY CALL HOLD PERIOD	2
HKD	-	-	-	USE IPX	-
HPB	-	-	-	USE IPX	-
IFA-D	-	-	-	USE IFN/IFS	-
IFN	0-15	0-31	0-9	GROUP INFLUENCE FUNCTION CODE	2
IFS	0-15	0-31	STAGE	GROUP INFLUENCE AFFECTED STAGE	2
IGN	PHASE	PHASE	0-199	PHASE INTERGREEN PERIOD	3
IGS	-	-	0-199	STARTING INTERGREEN PERIOD	3
IMU	-	-	-	SWITCH HANDSET TO TfL IMU	-
IOA	0-247	-	0-247, 255	I/O LINE RE-ALLOCATION	3
IOB	0-15	-	0-1	I/O BOARD 0-15 FITTED (IF 1)	2
IOL	0-30	-	-	LOGICAL I/O PORT STATUS	R
IOP	0-30	-	-	I/O PORT STATUS	R
IOR	0-247	-	-	REVIEW LOGICAL FUNC'S ON PHYSICAL I/O LINE	R
IPS	0-247	-	0-1	I/O LINE SENSE:0=NORM,1=INVERTED	2
IPX	0-247	-	0.0-31.8	INPUT EXTENSION TIMES	3
ITV	PHASE	PHASE	-	INTERGREEN THRESHOLD VALUE	R
KAC	-	-	-	USE KES/KEL	-
KAS	SENS	ASP	-	LMU ASPECT STATUS	R
KDB	-	-	-	LMU CONFIRMED DIM/BRIGHT STATE	R
KDL	-	-	0-255	LMU DIM/BRIGHT LIMIT	2

O=OPEN, R=READ ONLY, 2=LEVEL 2, 3=LEVEL 3, X=ON-STREET CONFIGURATION

CODE	INDEX1	INDEX2	DATA	DESCRIPTION	⇩
KDP	-	-	0-2	LMU DIM/BRIGHT PRESENT	2
KEL	SENS	ASP	-	LMU LEARNT LOAD	R
KES	SENS	-	-	LMU CURRENT SENSOR READING	R
KEV	-	-	-	LMU LAMP SUPPLY VOLTAGE	R
KLC	-	-	1-255	LMU CONFIRM TIME	2
KLD	SENS	ASP	0	LMU FAULT LOG DATA (LOAD DROPPED)	3
KLE	-	-	0-1	LMU ENABLE	3
KLM	-	-	-	LMU CONFIRMED SUPPLY STATE	R
KLP	-	-	-	USE KLD	-
KLR	-	-	1	LMU RESET	3
KLS	-	-	-	LMU LEARN STATUS	R
KLT	SENS	-	0-255	LMU LOAD TYPE	3
KLV	-	-	0-6	LAMP SUPPLY VOLTAGE TYPE	3
KML	-	-	0-1	LMU MONITOR LEARNING	3
KPU	0-3	-	0-255	POWER-UP DIAGNOSTICS	2
KRD	-	-	1	RED LAMP FAULT DELETE	3
KTE	-	-	0-5	LMU TRACE ENABLE (DIAGNOSTIC INFO)	2
KTR	SENS	0-49	-	LMU TRACE RECORD (DIAGONISTIC INFO)	R
LAT	0-7	PHASE	0.0-31.8	VARIABLE AMBER LEAVING TIME	3
LBH	-	-	0-255	LOW LAMP SUPPLY – BRIGHT HYSTERESIS	3
LBT	-	-	0-255	LOW LAMP SUPPLY – BRIGHT THRESHOLD	3
LDH	-	-	0-255	LOW LAMP SUPPLY – DIM HYSTERESIS	3
LDT	-	-	0-255	LOW LAMP SUPPLY – DIM THRESHOLD	3
LEV	-	-	0,2,3,X	ACCESS LEVEL OBTAINED	2
LFT	0-31	-	0-255	STAGE COMBINATION DURATION	2
LKA	STR'M	-	0-255	LINK ACTIVE FAIL TIME	2
LKD	STR'M	-	0-255	LINK DELAY TIME	2
LKI	STR'M	-	0-255	LINK INACTIVE FAIL TIME	2
LKM	0-1	-	0-1	LINK OVERRIDE TIMER MODE	2
LKO	STR'M	-	0-255	LINK OVERRIDE TIME	2
LKW	STR'M	-	0-255	LINK WINDOW TIME	2
LLD	STR'M	-	0-1	LOCAL LINK DISABLE	2
LMP	PHASE	-	1-3	ILLUMINATE PHASE ASPECT	3
LMX	-	-	-	USE RLT	-
LOD	-	-	-	RESERVED – DO NOT USE	-
LOG	-	-	-	TIMESTAMPED HISTORIC ROLLING LOG	R
LPT	-	-	0-1	MANUAL PANEL LAMP TEST	2
LRN	-	-	0-255	CONTROLLER RESET COMMAND	3
LSF	-	-	1-25	LAMP SUPPLY OFF CONFIRM TIME (20MS)	3
LSN	-	-	1-255	LAMP SUPPLY ON CONFIRM TIME (SECS)	3
LST	-	-	0-255	LAMP SUPPLY REPORT FAILURE CONFIRM TIME	3
MAX	PHASE	-	0-255	MAX PERIOD TIMESET A	2
MBX	PHASE	-	0-255	MAX PERIOD TIMESET B	2
MCX	PHASE	-	0-255	MAX PERIOD TIMESET C	2
MDM	-	-	204	ALLOWS TYCO INTERFACE TO BECOME ACTIVE	O
MDX	PHASE	-	0-255	MAX PERIOD TIMESET D	2
MEX	PHASE	-	0-255	MAX PERIOD TIMESET E (FIX VEH PERIOD SET A)	2
MFX	PHASE	-	0-255	MAX PERIOD TIMESET F (FIX VEH PERIOD SET B)	2
MGX	PHASE	-	0-255	MAX PERIOD TIMESET G (FIX VEH PERIOD SET C)	2
MHX	PHASE	-	0-255	MAX PERIOD TIMESET H (FIX VEH PERIOD SET D)	2
MIN	PHASE	-	0-255	PHASE MIN PERIOD	3
MND	-	-	0-1	MANUAL PANEL DISABLE	2
MOD	STR'M	-	-	CURRENT OPERATING MODE	R

O=OPEN, R=READ ONLY, 2=LEVEL 2, 3=LEVEL 3, X=ON-STREET CONFIGURATION

CODE	INDEX1	INDEX2	DATA	DESCRIPTION	⇩
MPA	0-3	-	0-255	MANUAL PANEL ALLOCATION	3
MST	0-3	-	DATA	SET MST SYNC CHANGE TIME	2
MTS	-	-	-	MASTER TIME SWITCH STATUS	R
MTV	PHASE	-	-	MINIMUM GREEN THRESHOLD VALUE	R
OFF	PLAN	0-1	0-255	GROUP OFFSET TIME	2
OFZ	STAGE	-	PHASES	PHASES IN STAGE (INC. OPTIONAL PHASES)	X
OMF	-	-	0-1	INTEGRAL OMU (IMU) FITTED	2
OMH	-	-	-	INTEGRAL OMU HARD ERROR CODE	R
OMS	0-2	-	-	INTEGRAL OMU SOFT ERROR CODES	R
OTF	-	-	0-1	INTEGRAL OTU FITTED	3
OTH	-	-	-	INTEGRAL OTU HARD ERROR CODE	R
OTO	0-1	0-1	0-255	ALLOCATE AN INTEGRAL OTU OUTPUT BIT	2
OTS	0-2	-	-	INTEGRAL OTU SOFT ERROR CODES	R
PA2	UNIT	T/SET	0-255	PHASE A2 COMPENSATION TIME	2
PAR	STR'M	0-4	0-3	PEDESTRIAN ALL RED (SECONDS)	3
PB2	UNIT	T/SET	0-255	PHASE B2 COMPENSATION TIME	2
PBG	0-7		0-1	IDENTIFY PUSH-BUTTON DFM GROUPS	2
PBT	PHASE	-	0-255	PED BL'OUT/FL'ING GRN TIME (SEC)	3
PCx	UNIT	T/SET	0-255	PHASE A TO PHASE Z COMPENSATION TIME	2
PC2	UNIT	T/SET	0-255	PHASE C2 COMPENSATION TIME	2
PD2	UNIT	T/SET	0-255	PHASE D2 COMPENSATION TIME	2
PDD	PHASE	-	0-255	PEDESTRIAN DEMAND DELAY TIME (SECONDS)	2
PDE	UNIT	T/SET	0-1	PRIORITY DEMAND ENABLE	2
PDR	UNIT	-	0-255	PRI. DFM SELF-RESET ENABLE	2
PDS	-	-	-	DISP. PRIORITY DEM/EXTS	R
PDX	PHASE	-	0.0-31.8	PEDESTRIAN DEMAND EXTENSION (SECONDS)	2
PE2	UNIT	T/SET	0-255	PHASE E2 COMPENSATION TIME	2
PEV	STR'M	-	0-2	PEDESTRIAN ENABLE VA MODE	3
PF2	UNIT	T/SET	0-255	PHASE F2 COMPENSATION TIME	2
PFD	UNIT	-	0-255	FIRST PRIORITY DELAY TIMER	2
PFT	0-2	-	DATA	RTC POWER FAIL LIMIT TIME	2
PGT	-	-	-	USE MIN	-
PHC	0-7	-	0-255	HURRY CALL PREVENT PERIOD	2
PHD	PHASE	-	0-1	MANUAL PHASE DEMAND	2
PHE	PHASE	-	0-1	MANUAL PHASE EXTENSION	2
PHS	-	-	-	FIRMWARE VERSION IN PHS	R
PIA	-	-	-	PRIORITY INH. TIMER STATUS	R
PIC	-	-	-	PROGRAM PROM ID CODE	R
PIR	0-479	-	0-255	CONDITIONING TIMERS (MAY BE 0.0-31.8)	2
PIT	STR'M	0-3	0-255	PELICAN INTERGREEN TIME (SECONDS)	3
PIU	-	-	-	PRIORITY UNITS INHIBITED	R
PLD	-	-	-	PLD VARIANT AND ENABLED FACILITIES	R
PLE	PLAN	-	0-255	PLAN ENTRY TIME	2
PLI	PLAN	-	0-15	PLAN INFLUENCE SELECTION	2
PLT	PLAN	GROUP	0-255	PLAN-GROUP TIME SETTINGS	2
PLX	PLAN	-	0-255	PLAN EXIT TIME	2
PME	-	-	CODE	MAINTENANCE ACCESS	O
PMT	UNIT	-	0-255	PRIORITY MONITOR TIME (0s-2550s)	2
PMV	-	-	0-31	PED. MOVEMENT ALGORITHM	2
PRE	UNIT	T/SET	0-1	PRIORITY REV. DEM. ENABLE	2
PRI	UNIT	T/SET	0-1	REVERTIVE DEMANDS TO START INHIBIT TIMER	2
PSA	UNIT	PHASE	0-1	PRIORITY : VA DEMANDS ALLOWED	2
PSD	UNIT	-	0-255	PRIORITY 2^{ND} DELAY TIMER	2
PSE	UNIT	PHASE	0-1	PRIORITY : VA DEMANDS ENFORCED	2
PTM	PHASE	-	0-1	PRE-TIMED MAXIMUM ENABLE	2

O=OPEN, R=READ ONLY, 2=LEVEL 2, 3=LEVEL 3, X=ON-STREET CONFIGURATION

CODE	INDEX1	INDEX2	DATA	DESCRIPTION	⇩
PTX	PHASE	-	0-255	PRE-TIMED MAXIMUM EXTRA PERIOD	2
PUI	UNIT	-	0-FF	PRIORITY UNITS TO BE INH.	2
PUP	UNIT	PHASE	-	PRIORITY UNIT PHASE	R
PUT	UNIT	-	-	PRIORITY UNIT TYPE	R
PVE	UNIT	T/SET	0.0-31.8	PRIORITY EXTENSION TIME	2
PVG	UNIT	-	0-255	DET. INTERRUPT PERIOD	2
PVI	UNIT	T/SET	0-255	INHIBIT TIME PERIOD	2
PVM	UNIT	T/SET	0-255	PRIORITY MAXIMUM TIME	2
PVP	PHASE	-	-	PRIORITY VEH. UNIT STATUS	R
PVS	STAGE	-	-	PRIORITY VEH. STAGE STAT.	R
PVU	UNIT	-	-	PRIORITY VEH. UNIT STATUS	R
PWN	STAGE	-	0-255	PED. WINDOW PERIOD	2
RAT	PHASE	-	0-255	PHASE RED/AMBER TIME	3
RDF	-	-	1	RESET DETECTOR FAULT MON.	2
RET	-	-	-	RESERVED – DO NOT USE	-
REX	STR'M	-	0-31.8	ALL-RED EXTENSION PERIOD	2
RFL	-	-	1	RESET FAULT LOG	2
RLM	STR'M	-	0-255	NUMBER OF RLM CHANNELS ENABLED	3
RLS	-	-	0-9	(FIRST) RED LAMP SPEED	2
RLT	PHASE	PHASE	0-255	RLM EXTEND INTERGREEN TIME	3
RMR	-	-	0-1	REMOTE RECONNECT DISABLED/ENABLED	2
RMX	STR'M	-	0-255	ALL-RED MAXIMUM PERIOD	2
RPL	-	-	0-15, 255	REQUEST NEW CLF PLAN	2
RRT	-	-	1	REQUEST LAMP SUPPLY RELAY TEST	3
SAC	-	-	0-255	ON-STREET CONFIGURATION ACCESS CODE	3
SAT	0-31	-	1-3	SDE ASSESSOR TYPE	3
SCI	0-3	-	-	EXTRA CLEARANCE STATUS	R
SCR	0-3	-	-	EXTRA CLEARANCE REQUEST	R
SCT	PHASE	-	0-50	SDE/SA EXTRA CLEAR. TIME	3
SDD	STR'M	-	0-1	SDE/SA DISABLED ON STREAM	3
SDS	-	-	0-2	TYPE OF HIGH SPEED VEHICLE DETECTION REQ.	3
SDT	-	-	-	USE SAT	-
SEA	0-3	-	-	SPEED EXTENSION STATUS	R
SGT	-	-	1	RESET CLF CYCLE (GROUP TIME)	2
SHC	0-7	-	-	HURRY CALL STATUS	R
SIC	-	-	-	SECONDARY (PHP) PROC. FIRMWARE VERSION	R
SIE	-	-	-	USE RLT	-
SLA	-	-	0-255	SIMULATED LAMP LOADS ACCESS CODE	3
SLL	PHASE	R,A,G	0-255	SIMULATED LAMP LOADS	3
SPE	0-31	-	-	SDE/SA SPEED AND LOOP ACTIVATIONS	R
SPH	PHASE	-	-	STATUS OF A PHASE	R
STA	-	-	-	CONTROLLER STATUS MESSAGE	R
STG	-	-	2-31	NUMBER OF CONFIGURED STAGES	X
STM	0-6	-	DATA	SET MASTER TIME CLOCK (INC DATE)	2
STP	0-31	-	0-255	MANUAL STEP-ON TIME	2
STS	STR'M	-	-	STATUS OF A STREAM	R
SWS	0-31	-	0-1	SWITCH FACILITY	2
TCS	-	-	-	TRIP CHECK SUM – **ENGINEERING USE ONLY**	3
TDY	0-15	-	-	TIMETABLE DAY TYPES	R
TKD	-	-	-	USE PDX	-
TKE	-	-	0-255	CONTROLLER RESET COMMAND	3
TMA	-	-	0-255	CONTROLLER TEST MODE (ACCESS)	3
TMC	-	-	0-255	CONTROLLER TEST MODE (COUNTDOWN)	2
TMT	-	-	0-255	CONTROLLER TEST MODE (TIMER)	2

O=OPEN, R=READ ONLY, 2=LEVEL 2, 3=LEVEL 3, X=ON-STREET CONFIGURATION

CODE	INDEX1	INDEX2	DATA	DESCRIPTION	⇩
TOD	-	-	TIME/DATE	MASTER TIME CLOCK SETTING	2
TOT	-	-	0-1	TC/TO UTC BIT TAKE OVER TYPE	2
TSD	0-63	-	DATE+D/C	SPECIAL DAYS (D/C = DAY CODE)	2
TSE	-	-	-	TRIP SOFT ERROR – **ENGINEERING USE ONLY**	3
TSH	0-31	0-1	DATE	SPECIAL HOLIDAY PERIODS	2
TSW	0-63	0-5	DATA	TIME SWITCH TIMETABLE (OLD FORMAT)	2
TTB	0-63	-	DATA	TIME SWITCH TIMETABLE (NEW FORMAT)	2
TWD	-	-	1 or 2	TRIP WATCHDOG **WARNING – CAUSES IMMEDIATE SHUTDOWN CONSEQUENTLY MUST NOT BE USED UNDER ANY CIRCUMSTANCES TO TEST EQUIPMENT WITH SIGNALS ON AND CONTROLLING TRAFFIC.**	3
TYG	1-3	-	PHASES	GAINING PHASE TYPES	X
UDP	-	-	-	RESERVED – DO NOT USE	-
UDT	0-7	-	0-255	U/D TIMEOUT (IN 10 SECOND UNITS)	2
UIE	STR'M		0-255	UTC INHIBIT EXTENS'N PERIOD (STANDALONE)	2
USE	-	-	-	RESERVED – DO NOT USE	-
UWD	-	-	0-2550s	UTC WATCHDOG	2
VAD	-	-	-	USE PEV/PTM	-
VAE	-	-	-	USE EXT/IPX	-
VAM	-	-	-	USE MIN	-
VAX	-	-	-	USE MAX TO MDX	-
VIO	1-15	-	-	FIRMWARE VERSION IN EACH SERIAL I/O CARD	R
VLS	1-6	-	-	FIRMWARE VERSION IN EACH LSLS CARD	R
WEK	-	-	1-52	WEEK SETTING	2
WID	-	-	14 - 80x24	HANDSET DISPLAY WIDTH	O

13 INDEX

— D —

— E —

— F —

— H —

— I —

— K —

— L —

— M —

— N —

— O —

— P —

— R —

— S —

— T —

— U —

— V —

— W —

— Z —

14 APPENDIX – ENGINEERING COMMANDS

14.1 General

The following engineering commands have been included to enable access to more comprehensive status information than that generally available from the standard handset commands.

Most of these commands are only of use to Siemens Engineering. However the ENG command does allow the configuration and maintenance Engineers access to additional status information not available from the standard handset commands. The 'ENG' command is detailed more thoroughly in the rest of this section.

	DESCRIPTION AND REMARKS	
BAS	BAS : <Base Type 0 to 3> Number **BAS**e used by the engineering commands: `BAS:0` – Single byte displayed in hexadecimal (two digits) `BAS:1` – Single byte displayed in binary (eight bits) `BAS:2` – Single byte displayed in decimal (0 to 255) `BAS:3` – Four bytes displayed in binary (32 bits) 'BAS:3' is particularly useful since it displays 32 bits simultaneously and thus allows the status of all 32 phases or stages to be examined when used with various ENG codes. If the display device is not wide enough, the base will revert to eight binary bits.	2
ENG	ENG <Code> <Offset> : <RAM Contents> Displays particular engineering items in the controller's memory.	R
ENC	ENC <Address 0 to 7FFFF> : <PROM Contents> Displays the contents of the configuration PROM. In particular, the locations 'ENC 4' to 'ENC 7' hold the four byte checksum for the PROM.	R
ENR	ENR <Address 0 to 3FFFF> : <RAM Contents> Displays the contents of the working RAM.	R
ENS	ENS <Address 0 to 7FF> : <RAM Contents> Displays the contents of the shared RAM on the SDE/SA card.	R
ENO	ENO <Address 0 to FFF> : <RAM Contents> Displays the contents of the shared RAM on the integral OTU card.	R
ENM	ENM <Address 0 to FFF> : <RAM Contents> Displays the contents of the shared RAM on the integral OMU card.	R

14.2 ENG Command Explanations

This section gives an explanation on what each of the codes used in the 'ENG' handset command means.

The 'Code' column identifies the 'ENG' code number used to access that particular item of information. It also identifies the display base, '`BAS:n`', which is best suited to each particular engineering command, or '`(ANY)`' if display base is not critical as just a non-zero value in the byte indicates the condition.

The ‘Description’ column shows the mnemonic, the title and then the format of the information. The mnemonic is the name used within the controller’s software and is only included here as an aid to memory. It should not be entered on the handset.

Those ENG commands which are best suited to ‘BAS:3’, i.e. 32 binary bits, usually show the status of all 32 phases, i.e. one bit per phase set to ‘1’ if the condition is true. This will be written in the following form in this section so that it identifies of the order of the phases A to Z, followed by A2 to F2, starting at the right-hand side:

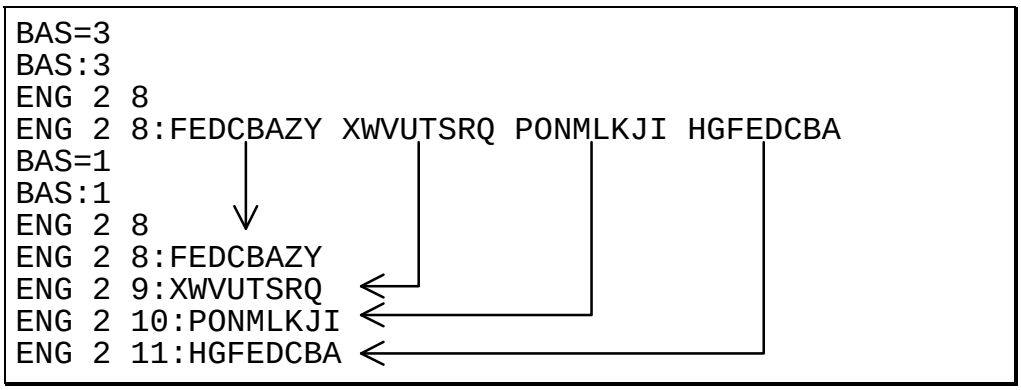
```
ENG 2 8:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
        |    | \                        /
        F2   A2    PHASES Z THROUGH TO A
```

Alternatively, the command may show the status of all 32 stages, i.e. one bit per stage, numbered 0 to 31, again starting at the right-hand side.

```
ENG 2 12:10987654 32109876 54321098 76543210
         |  \       /  \       /  \        |
        31  29     20  19     10   9       0
```

‘BAS:3’ is only available if the display device is wide enough, see ‘WID’ on page 21. If the display is not wide enough, the controller will automatically revert to ‘BAS:1’, i.e. just one byte (eight binary bits) is displayed instead of 32 bits.

If a 32-bit item is being viewed one byte at a time, the order in which the controller’s Motorola processor stores the individual bytes within the four byte / 32-bit item becomes important since the ENG command looks directly at each byte:



Note that the IC4 Controller Emulator runs on an Intel processor that stores its bytes the other way round, i.e.

```
ENG 2 8:HGFEDCBA
ENG 2 9:PONMLKJI
ENG 2 10:XWVUTSRQ
ENG 2 11:FEDCBAZY
```

14.3 "ENG" Code List (Sorted by 'Description')

MNEMONIC	CODE	OFFSET	DESCRIPTION
DFMFLT	122	0-11	ACCEPT DETECTOR FAULT(S) see also H/S command ADF
UTCAIN	52	0-11	ACCEPTED UTC INPUTS
ALTDFM	196	0	ALTERNATE DFM TIME SET SELECTED FLAGS
ALTMAX	51	0	ALTERNATIVE MAX. GREEN SELECT FLAGS
AVLMDE	60	0-15	AVAILABLE MODE TABLE
ESP_MOVA_Forc	269		BITS TO/FROM SERIAL MOVA/DUSC UNIT
CABCTL	119	0	CABINET ALARM CONTROL
CABLMP	147	0	CABINET ALARM LAMP CONTROL
CCOUTF	40	0	CALL/CANCEL COMPLIMENTARY OUTPUTS
CCSTT	96	0-7	CALL/CANCEL STATE NO.
CCOUTT	39	0	CALL/CANCEL TRUE OUTPUTS
CURPLN	85	0	CLF CURRENT PLAN NO.
CLFDEM	93	0-3	CLF DEMAND
ENT_TIM_CTRL	218		CLF ENTRY TIMER CONTROL INDICATION
EXIT_TIM_CTRL	219		CLF EXIT TIMER CONTROL INDICATION
CLFFRC	92	0-3	CLF FORCE
CLFKEP	94	0-3	CLF KEEP
CLFINH	192	0-3	CLF PEDESTRIAN INHIBIT WORD
CLFRST	95	0-3	CLF RESTRICT
OICDEM	159	0-3	COMBINED PHASE DEMAND
OICKEEP	161	0-3	COMBINED PHASE KEEP
OICKEOR	162	0-3	COMBINED KEEP OVERRIDE
OICREQ	160	0-3	COMBINED PHASE REQUEST
OICREST	163	0-3	COMBINED PHASE RESTRICTION
CNDARY	151	0-255	CONDITIONING ARRAY
CNDTMA	58	0-59	CONDITIONING TIMERS ACTIVE
CNDPRV	59	0-59	CONDITIONING TIMERS ACTIVE ON LAST 200Ms
CNDTER	50	0-59	CONDITIONING TIMERS JUST TERMINATING
LMPMON_confirmed_drops	232		CONFIRMED LAMP FAULTS
cor_errors_confirmed	228		CORRESPONDENCE ERRORS CONFIRMED
CURCOM	131	0-7	CURRENT COMPENSATION TIME (PRIORITY UNITS)
MODE	107	0-3	CURRENT MODE
CURSTG	105	0	CURRENT STAGE
ROWFAZ	33	0-3	CURRENTLY ACTIVE PHASES/STAGES
DFMLOG	285		DFM FAULTS - FAILED
DFMDSF0	286		DFM FAULTS - FAILED INACTIVE
DFMDSF1	287		DFM FAULTS - FAILED ACTIVE
DFM_FAULT_STATE	266		DFM FAULT STATE
DFMINH	116	0-7	DFM INHIBIT (PRIORITY UNITS)
DISMDE	150	0-7	DISABLED MODES ON STREAMS
DOORSWI	265		DOOR SWITCH INDICATION
DSRACC	118	0	DSR ACCEPTED STATE
dprcpy	227		DUAL PORT RAM COPY
ENHRLM	211	0-1	ENHANCED RLM PHASE DELAYS RUNNING
ESP_Active	252		ENHANCED SERIAL PORT ACTIVE
ESPORT	275		ESP DEBUG INFORMATION
XIGNDM	127	0-1	EXTRA I/G FOR PHASE BY SDE
FLDATA	153	0-127	FAULT LOG DATA (CURRENT LOG)
FLFLGS	152	0-63	FAULT LOG FLAGS (CURRENT LOG)

MNEMONIC	CODE	OFFSET	DESCRIPTION
FLAFLF	168	0-7	FAULT LOG FLAGS THAT CAUSE FLASHING
FLFCOM	169	0-7	FAULT LOG FLAGS THAT CAUSE SPECIAL CONDITIONING FLAG TO BE SET
PVD1EX	170	0	FIRST PRIORITY DELAY TIMER EXPIRED FLAG
FTCCMPL	99	0-3	FIXED TIME COMPEL
FTCM_acive	239		FIXED TIME TO CURRENT MAXIMUMS ACTIVE
pbusflt	234		FULL PHASE BUS FAULT DATA
GPIPX	248		GENERAL PURPOSEINPUTS EXTENDED
IO_cards_ok	290		GOOD I/O CARDS
GPS_clock_counters	253		GPS CLOCK COUNTERS
HIPRMD	270		HIGHER PRIORITY MODE ACTIVE
HLDENA	21	0-3	HOLD ENABLE
HLDELC	47	0	HOLD I/G EXTENSION LOOPS CLEARED
HLDELO	46	0	HOLD I/G EXTENSION LOOPS OCCUPIED
HLDON	20	0-3	HOLD IN PROGRESS
HIGNO	23	0-3	HOLD INTERGREEN EXTENSION FACILITY NO
HLDREQ	22	0-3	HOLD REQUEST
INHENA	134	0-7	INHIBIT ENABLE (PRIORITY UNITS)
GPIN0	24	0-11	INPUT PORT DATA SET TO 0
GPIN1	25	0-11	INPUT PORT DATA SET TO 1
INTERGREENS_EXPIRED	244		INTERGREENS EXPIRED
JNC-checksum	241		JUNCTION DATA CHECKSUM
KBSACT	255		KERBSIDE INPUTS ACTIVE
LMPDIM	189	0	LAMP DIM/BRIGHT REQUEST (FFH=DIM)
PRSFLS	268		LAMP FLASHING STATES
LMPMON_flashing_config_fault	231		LAMP MONITOR FLASHING CONFIGURATION FAULT
LMPON	188	0	LAMP ON/OFF REQUEST (FFH=ON)
FAZCMD	1	0-15	LAMP SEQUENCE COMMAND TABLE
LPSPRD	67	0	LAMP SUPPLY IS PRESENT
LSTINP	26	0-11	LAST FILTERED INPUTS
PBNLAT	284		LATCHED PUSH BUTTONS
LNKINH	191	0-1	LOCAL LINK PED DEMAND AND EXTN INHIBIT
MNCMPL	98	0-3	MANUAL COMPEL
MANCND	63	0-7	MANUAL CONTROLS TABLE INPUT DATA
MANIND	62	0-2	MANUAL INDICATIONS TABLE
MANMOP	77	0	MANUAL MODE OPERATIVE FLAG
MANSEL	72	0	MANUAL MODE SELECTED FLAG
SRMMSK	187	0-1	MASK TO DISABLE PHASES
MTCINF	45	0	MASTER TIME CLOCK INFLUENCE
NOTAUT	56	0-3	MODE SELECT SWITCH NOT IN AUTO POSITION
background_checksum_counter	230		MONITOR CRC ROUTINES
MTCDEL	65	0-3	MTC DELETED PHASES/STAGES
NXTSTG	104	0	NEXT STAGE
FRETIM	175	0	NUMBER OF TIMES FREE TIME WAS SET TO ZERO
ONCDOK	259		ON CROSSING DETECTOR CHECKING
OMURUN	273		OMU AVAILABLE FLAG
ONCBAD	258		ON CROSSING DETECTOR FAULTY
ONCACT	257		ON CROSSING DETECTORS ACTIVE
GPOUT	43	0-11	OUTPUT PORT DATA
SBYENB	55	0-7	PART TIME ENABLE FLAG

MNEMONIC	CODE	OFFSET	DESCRIPTION
PEDNOWAIT	184	0-3	PEDESTRIAN DEMANDS WHICH DO NOT LIGHT WAIT INDICATORS (SET UP IN CONDITIONING)
PARTMA	264		PEDESTRIAN ALL RED TIMER ACTIVE
CDYTMA	262		PEDESTRIAN CLEARANCE DELAY PERIOD ACTIVE
CRDTMA	263		PEDESTRIAN CLEARANCE RED PERIOD ACTIVE
CMXTMA	261		PEDESTRIAN EXTENDABLE CLEARANCE PERIOD ACTIVE
PBTTMA	260		PEDESTRIAN MINIMUM CLEARANCE PERIOD ACTIVE
PEDBUT	29	0-3	PEDESTRIAN WAIT INDICATOR CONTROL
WTCTRL	216	0-3	PEDESTRIAN WAIT LAMP STATE
LLDMD	183	0-3	PELICAN LOCAL LINK PEDESTRIAN DEMANDS (SET UP IN CONDITIONING)
SCINH	182	0-3	PELICAN UTC VEHICLE EXTENSION INHIBIT (SET UP IN CONDITIONING)
pbuso	235		PHASE BUS DATA NOT CLEARED BY POWER OFF/ON
pbus	226		PHASE BUS INTERFACE ITEMS
FAZDIS	108	0-31	PHASE DISPLAY TABLE
EXTLCL	31	0-3	PHASE EXTENSION LOOPS CLEARED
EXTLOC	30	0-3	PHASE EXTENSION LOOPS OCCUPIED
EXTTMA	42	0-3	PHASE EXTENSION TIMERS ACTIVE
OIKEEP	156	0-55	PHASE KEEP
MXAFAZ	38	0-3	PHASE MAX. GREEN TIMERS ACTIVE
OIDEM	2	0-55	PHASE MOVEMENT DEMANDS PER MODE
OIKEOR	157	0-55	PHASE OVERRIDE PER MODE
OIREQ	155	0-55	PHASE REQUEST PER MODE
OIREST	158	0-55	PHASE RESTRICTION PER MODE
FAZSTU	35	0-31	PHASE STATUS TABLE
FZREST	15	0-3	PHASE/STAGE RESTRICTIONS ENG15 0-3 ENG15 4-3
TONORW	124	0-3	PHASES CHANGING TO NO RIGHT OF WAY
TORW	154	0-3	PHASES CHANGING TO RIGHT OF WAY
PHASE_ENABLES	243		PHASES ENABLED
GIVNRW	11	0-3	PHASES GIVEN RIGHT OF WAY
LMUINH	215	0-3	PHASES INHIBITING BY RLM
MINFAZ	37	0-3	PHASES IN MINIMUM GREEN PERIOD
ATNORW	10	0-3	PHASES NOT AT RIGHT OF WAY
SKPCUR	137	0-28	PHASES SKIPPED OR CURTAILED (PRIORITY UNITS)
TERGAP	126	0-3	PHASES TERMINATING ON A GAP
FZTMEX	125	0-3	PHASES TERMINATING WITH EXTENSIONS PRESENT
GAINRW	12	0-3	PHASES TO GAIN RIGHT OF WAY
GAIRWD	14	0-3	PHASES TO GAIN RIGHT OF WAY DELAYED
LOSERW	13	0-3	PHASES TO LOSE RIGHT OF WAY
LOSERWD	251		PHASES TO LOSE RIGHT OF WAY DELAYED
ROWFAZ	33	0-3	PHASES/STAGES AT RIGHT OF WAY
FAZDEM	16	0-3	PHASES/STAGES DEMANDED ENG16 0-3 / 4-3
FZKEEP	17	0-3	PHASES/STAGES TO KEEP R.O.W ENG17 0-3 / 4-3
LOSING_PHASES	245		PHASES WHICH LOST RIGHT OF WAY
GAINING_PHASES	247		PHASES WHICH MAY GAIN RIGHT OF WAY
PRSLMP	194	0-8	PRESENT STREET LAMP STATES ENG194 0-3 /4-3/ 8-3
PTXTMA	272		PRE-TIMED MAXIMUM EXTRA PERIOD ACTIVE
VPRVNT	32	0-3	PREVENT PHASE/STAGE FROM CONDITIONING ENG32 0-3/ 4-3
PRIDEM	132	0-7	PRIORITY DEMAND
PRLTCH	143	0-7	PRIORITY DEMAND LATCH
PRIEXT	133	0-7	PRIORITY EXTENSION
PRIINP	130	0-7	PRIORITY INPUT ACTIVE

MNEMONIC	CODE	OFFSET	DESCRIPTION
PRSTAT	117	0	PRIORITY STATUS
PBKLAT	256		PUSH BUTTON AND KERBSIDE LATCH
PBNACT	254		PUSH BUTTON DEMANDS ACTIVE
SIOCP	291		RAW SERIAL I/O
RTCONF	238		REAL TIME CLOCK CONFIRM FLAG
CNGTYP	180	0-7	RED TO GREEN CHANGE TYPE FOR PELICAN PEDS
relaytest	229		RELAY TEST INFORMATION
REVLCH	144	0-7	REVERTIVE PRIORITY DEMAND LATCH
RIPCNG	249		RIPPLE CHANGE ACTIVE
RLM_DELAYS_EXPIRED	246		RLM DELAY TIMERS EXPIRED
SCRTCH	167		SCRATCH PAD WORKING AREA
			(REFER TO HANDBOOK FOR OFFSETS)
SDEXOP	149	0-3	SDE EXTENSION INHIBIT
SDINAC	123	0	SDE/SA CARD INACCESSIBLE
SSWMDE	76	0	SELECT SWITCH MODE
SSWACT	271	0-7	SELECT SWITCH MODE ACTIVE
SOFCND	146	0	SIGNALS OFF FROM CONDITIONING
stack_frame	233		STACK DUMP ON FATAL ERROR
SWLMPS	177	0	SOFTWARE LAMP STATE FLAG
STFIRS	19	0-3	STAGE INDIRECT RESTRICTIONS
LMUSTG	240		STAGES INHIBITED BY RED LAMP MONITORING
RIPSTG	250		STAGES TERMINATED BY THE RIPPLE CHANGE
SPCMPL	195	0-3	STEP ON COMPEL 195 0-3/4-3
SBYENB	55	0-7	STANDBY ENABLED FLAG
SUGSTG	18	0-7	SUGGESTED STAGE (PER STREAM)
SWHDIS	41	0-7	SWITCHED SIGN TABLE
SYSLED	176	0	SYSTEM ERROR LED STATUS (BIT4 – 1=LED ON 0=OFF)
TCSYCF	237		TIME CLOCK UTC SYNC FLAG
TMRSEC	164	0-255	TIMER SECONDS VALUE FOR TIMERS SPECIFIED BY
			TIMER MAP
TMRSTU	165		TIMER STATUS FOR TIMERS SPECIFIED BY TIMER MAP
			(REFER TO HANDBOOK FOR OFFSETS)
SAY_checksum	242		TIMING DATA CHECKSUM
TYCODB	276		TYCO DEBUG INFORMATION
TYCORX	277		TYCO RECEIVE BUFFER, LAST RECEIVED MESSAGE
TYCOTX	278		TYCO TRANSMIT BUFFER, LAST TRANSMITTED MSG
UNLPUF	197	0-3	UNLATCHED PUFFIN DEMANDS
UTCINF	53	0	UTC CONDITIONS
DFMGRP_FAULTS	280		UTC 'DF' BIT FOR EACH DFM GROUP
UTCFRC	48	0-3	UTC FORCE BITS
UTCFOP	54	0	UTC FORCE BITS PRESENT
UTCINH	190	0-3	UTC PEDESTRIAN AND EXTENSION INHIBIT WORD
VRDMND	100	0-3/4-3	VR DEMANDS PHASE/STAGE
VRKOVR	102	0-3/4-3	VR KEEP OVERRIDE PHASE/STAGE
VRKEEP	101	0-3/4-3	VR KEEP VRKOVR PHASE/STAGE
LATCHD	27	0-3/4-3	VR LATCHED DEMANDS FOR PHASES/STAGES
VRREST	103	0-3/4-3	VR RESTRICT PHASE/STAGE
UNLTCH	28	0-3/4-3	VR UNLATCHED DEMANDS FOR PHASES/STAGES

14.4 "ENG" Code List (Sorted by 'Code')

CODE **DESCRIPTION**

1 FAZCMD – Lamp Sequence Command Table

BAS:1 ENG 1 0:XXXXXXXX – Commands for Phase A
ENG 1 1:XXXXXXXX – Commands for Phase B
ENG 1 2:XXXXXXXX – Commands for Phase C
.....
ENG 1 31:XXXXXXXX – Commands for Phase F2

Where each bit indicates the following:
00000001 – Lamps Off
00000010 – Go To Standby
00000100 – Start-up
00001000 – Sequence Timer Expired
00010000 – Go To Red
00100000 – Go To Green
01000000 – Light Wait Indicator
10000000 – Request Green

Note that a phase may have the 'Request Green' flag set even though it may never actually go to green.

The request for green informs the controller that this phase may gain right of way and that all of the intergreen times to this phase need to be checked.

When all of the intergreens have expired, the 'Request Green' flag is cleared from here and the appropriate bit is set in INTERGREENS_EXPIRED (ENG 244).

Also see page 215.

CODE **DESCRIPTION**

2 OIDEM – Phase And Stage Movement Demands Per Mode

BAS:3 Phase/Stage Demands For each mode:

```
FT:      ENG 2   8:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 2  12:10987654 32109876 54321098 76543210

VA:      ENG 2  16:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 2  20:10987654 32109876 54321098 76543210

CLF:     ENG 2  24:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 2  28:10987654 32109876 54321098 76543210

Manual:  ENG 2  32:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 2  36:10987654 32109876 54321098 76543210

Hurry:   ENG 2  40:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 2  44:10987654 32109876 54321098 76543210

UTC:     ENG 2  48:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 2  52:10987654 32109876 54321098 76543210

P/Time:  ENG 2  56:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 2  60:10987654 32109876 54321098 76543210

S/Up:    ENG 2  64:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 2  68:10987654 32109876 54321098 76543210

FVP:     ENG 2  72:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 2  76:10987654 32109876 54321098 76543210

StepOn:  ENG 2  80:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 2  84:10987654 32109876 54321098 76543210

Em/Veh:  ENG 2  96:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 2 100:10987654 32109876 54321098 76543210

Prior:   ENG 2 104:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 2 108:10987654 32109876 54321098 76543210

Pel/VA:  ENG 2 112:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 2 116:10987654 32109876 54321098 76543210
```

10 ATNORW – Phases Not At Right Of Way

BAS:3 ENG 10 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

See page 215.

11 GIVNRW – Phases Given Right Of Way

BAS:3 ENG 11 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to ‘1’ indicates that the phase is either moving to right of way (ENG 154 – ‘TORW’) or is at right of way (ENG 33 – ‘ROWFAZ’). Also see page 215.

CODE **DESCRIPTION**

12 GAINRW – Phases To Gain Right Of Way

BAS:3 ENG 12 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that this phase may gain right of way during the current stage movement, but that it is currently running a gaining phase delay.

(Also see ENG 247 – 'GAINING_PHASES' and page 215)

13 LOSERW – Phases To Lose Right Of Way

BAS:3 ENG 13 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that this phase is to lose right of way during the current stage movement, but that it is currently running a losing phase delay.

Also see ENG 245 – 'LOSING_PHASES' and page 215.

14 GAIRWD – Phases To Gain Right Of Way Delayed

BAS:3 ENG 14 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that this phase may gain right of way during the current stage movement and its gaining phase delay (if any) has expired. See page 215.

15 FZREST – Phase/Stage Restrictions

BAS:3 ENG 15 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 15 4:10987654 32109876 54321098 76543210

A '1' means that the phase or stage is deleted and is the combination of OICREST (ENG163) and STGIRS (ENG19).

16 FAZDEM – Phases/Stages Demanded

BAS:3 ENG 16 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 16 4:10987654 32109876 54321098 76543210

A '1' means that the phase or stage is demanded when considering the next stage to move to. For example, if PMV is set to zero, the demands for Type 1 phases in the current stage will be excluded.

CODE	DESCRIPTION
17	FZKEEP – Phase/Stages To Keep Right Of Way
BAS:3	ENG 17 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA ENG 17 4:10987654 32109876 54321098 76543210 A '1' means that the phase or stage is to keep right of way when considering the next stage move. As well as taking into account extensions, this also indicates which phases are currently moving to right of way and those which are running min green timers, i.e. - any phases in GAINING_PHASES (ENG 247) which are also in PHASE_ENABLES (ENG 243) - any phases in TORW (ENG 154) - any phases in MINFAZ (ENG 37) - any phases in OICKEEP (ENG 161) which are not in OICKEOR (ENG 162)
18	SUGSTG – Suggested Stage
BAS:2	ENG 18 0:N – Suggested stage for stream 0 ENG 18 1:N – Suggested stage for stream 1 ..... ENG 18 7:N – Suggested stage for stream 7 Contains the number of the stage that the controller is considering moving to at a particular point in time.
19	STGIRS – Stage Indirect Restrictions
BAS:3	ENG 19 0:10987654 32109876 54321098 76543210 A '1' indicates that this stage may not be considered as a stage to move to when the controller is deciding which stage to move to because the move has been configured as an ignore for example.
20	HLDON – Hold In Progress
(ANY)	ENG 20 0:N – Hold in progress on stream 0 ENG 20 1:N – Hold in progress on stream 1 ..... ENG 20 7:N – Hold in progress on stream 7 A non-zero value indicates that a hold intergreen (all red extension) is in progress on that stream.
21	HLDENA – Hold Enable
(ANY)	ENG 21 0:N – Hold enabled on stream 0 ENG 21 1:N – Hold enabled on stream 1 ..... ENG 21 7:N – Hold enabled on stream 7 A non-zero value indicates that the hold intergreen is enabled on that stream.

CODE	DESCRIPTION
22	HLDREQ – Hold Request
(ANY)	ENG 22 0:N – Hold request is present on stream 0 ENG 22 1:N – Hold request is present on stream 1 ..... ENG 22 7:N – Hold request is present on stream 7 A non-zero value indicates that a hold intergreen request is present on that stream.
23	HIGNO – Hold Intergreen Extension Facility Number
BAS:2	ENG 22 0:N – Unit active on stream 0 ENG 22 1:N – Unit active on stream 1 ..... ENG 22 7:N – Unit active on stream 7 If 'N' is non-zero, it indicates the hold intergreen unit that is active during the current stage to stage move on the specified stream.
24	GPIN0 – Input Port Data Set To One When Inactive
BAS:1	ENG 24 0:XXXXXXXX – Inputs inactive on port 0 ENG 24 1:XXXXXXXX – Inputs inactive on port 1 ..... ENG 24 30:XXXXXXXX – Inputs inactive on port 30 A '1' indicates that that I/O line on the port was seen inactive during the previous 200ms.
25	GPIN1 – Input Port Data Set To One When Active
BAS:1	ENG 25 0:XXXXXXXX – Inputs Active on port 0 ENG 25 1:XXXXXXXX – Inputs Active on port 1 ..... ENG 25 30:XXXXXXXX – Inputs Active on port 30 A '1' indicates that that I/O line on the port was seen active during the previous 200ms.
26	LSTINP – Last Filtered Inputs
BAS:1	ENG 26 0:XXXXXXXX – Inputs Active on port 0 ENG 26 1:XXXXXXXX – Inputs Active on port 1 ..... ENG 26 30:XXXXXXXX – Inputs Active on port 30 A '1' indicates that that I/O line on the port was active at the end of the last 200mS cycle.

CODE **DESCRIPTION**

27 LATCHD – VR Latched Demands For Phases/Stages

BAS:3 ENG 27 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 27 4:10987654 32109876 54321098 76543210

A '1' indicates that there is a latched demand for the associated phase or stage, i.e. a demand present which can not normally be cleared until the phase/stage gains right of way. These demands may have been generated by various facilities.

Also see:

ENG 29 – PEDBUT	ENG 197 – UNLPUF
ENG 100 – VRDMND	ENG 216 – WTCTRL
ENG 184 – PEDNOWAIT	ENG 256 – PBKLAT

28 UNLTCH – VA Unlatched Demands For Phases/Stages

BAS:3 ENG 28 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 28 4:10987654 32109876 54321098 76543210

A '1' indicates that there is an unlatched demand for the associated phase or stage, e.g. a demand which may cease before the phase gains right of way. Normally only generated by special conditioning or call/cancel units.

29 PEDBUT – Pedestrian Wait Indicator Control

BAS:3 ENG 29 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the firmware is requesting the wait indicator to be illuminated.

Also see:

ENG 27 – LATCHD	ENG 197 – UNLPUF
ENG 100 – VRDMND	ENG 216 – WTCTRL
ENG 184 – PEDNOWAIT	ENG 256 – PBKLAT

30 EXTLOC – Phase Extension Loops Occupied

BAS:3 ENG 30 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that one or more of the detectors associated with the phase have been seen active during the previous 200ms sample period.

31 EXTLCL – Phase Extension Loops Cleared

BAS:3 ENG 31 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that one or more of the detectors associated with the phase were still active at the end of the previous 200ms sample period.

32 VPRVNT – Prevent Stage/Phase From Conditioning

BAS:3 ENG 32 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 32 4:10987654 32109876 54321098 76543210

CODE **DESCRIPTION**

33 ROWFAZ – Phases/Stages At Right Of Way

BAS:3 ENG 33 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 33 4:10987654 32109876 54321098 76543210

A bit set to '1' indicates that the phase/stage is at right of way. Also see page 215.

35 FAZSTU – Displays The Phase's Status

BAS:1 ENG 35 0:XXXXXXXX – Status of Phase A
ENG 35 1:XXXXXXXX – Status of Phase B
.....
ENG 35 31:XXXXXXXX – Status of Phase F2

Where each bit indicates the following:
00000001 – At Right Of Way
00000010 – Changing to No Right Of Way
00000100 – At No Right Of Way
00001000 – Changing to Right Of Way
00010000 – Stand-by / part-time state
00100000 – Not Used
01000000 – Not Used
10000000 – Not Used

37 MINFAZ – Phases In Minimum Green Period

BAS:3 ENG 37 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

38 MXAFAZ – Phases Max Green Timer Active

BAS:3 ENG 38 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the maximum green timer for the phase is currently active. Also see ENG 272 – PTXTMA.

39 CCOUTT – Call Cancel True Outputs

BAS:1 ENG 39 0:XXXXXXXX

Where each bit indicates the following:
00000001 – Output for Call/Cancel Unit 0 is Active
00000010 – Output for Call/Cancel Unit 1 is Active
.....
10000000 – Output for Call/Cancel Unit 7 is Active

40 CCOUTF – Call/Cancel Complimentary Outputs

BAS:1 ENG 40 0:XXXXXXXX

Where each bit indicates the following:
00000001 – Output for Call/Cancel Unit 0 is Inactive
00000010 – Output for Call/Cancel Unit 1 is Inactive
.....
10000000 – Output for Call/Cancel Unit 7 is Inactive

CODE	DESCRIPTION
41	SWHDIS – Switched Sign Table
(ANY)	ENG 41 0:N – Sign 0 is active ENG 41 1:N – Sign 1 is active ..... ENG 41 7:N – Sign 7 is active A non-zero value indicates that the switched sign is active.
42	EXTTMA – Phase Extension Timers Active
BAS:3	ENG 42 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA A bit set to '1' indicates that the extension timer or the extension input(s) for that phase are active.
43	GPOUT – Output Port Data
BAS:1	ENG 43 0:XXXXXXXX – Outputs Active on port 0 ENG 43 1:XXXXXXXX – Outputs Active on port 1 ..... ENG 43 30:XXXXXXXX – Outputs Active on port 30
45	MTCINF – Master Time Clock Influence
BAS:1	ENG 45 0:76543210 – MTCF7 through to MTCF0 A bit set to '1' indicates which master time clock flags are operative/set. These flags are used in special conditioning to allow construction of time dependant conditioning.
46	HLDELO – Hold Intergreen Extension Loops Occupied
BAS:1	ENG 46 0:76543210 – Loop 7 through to loop 0 A bit set to '1' indicates that the all-red extension input has been seen active during the previous 200ms-sample period.
47	HLDELC – Hold Intergreen Extension Loops Cleared
BAS:1	ENG 47 0:76543210 – Loop 7 through to loop 0 A bit set to '1' indicates that the all-red extension input was still active at the end of the previous 200ms-sample period.
48	UTCFRC – UTC Force Bits
BAS:3	ENG 48 0:10987654 32109876 54321098 76543210 A bit set to '1' indicates force bit active for that stage (31 through to 0).

CODE	DESCRIPTION

50 CNDTER – Conditioning Timers Just Terminated

BAS:3 ENG 50 0:10987654 32109876 54321098 76543210 – 31 to 0
ENG 50 4:32109876 54321098 76543210 98765432 – 63 to 32
ENG 50 8:54321098 76543210 98765432 10987654 – 95 to 64
.....
ENG 50 56:98765432 10987654 32109876 54321098 – 479 to 448

A bit set to '1' indicates that the particular timer has just terminated.

For a complete list of the Conditioning Timers, refer to ENG 58.

51 ALTMAX – Alternative Max Green Select Flag

BAS:1 ENG 51 0:XXXXXXXX

Where each bit has the following significance:
00000001 – 1st alternate max green set active (MAXSETB)
00000010 – 2nd alternate max green set active (MAXSETC)
00000100 – 3rd alternate max green set active (MAXSETD)
00001000 – 4th alternate max green set active (MAXSETE)
00010000 – 5th alternate max green set active (MAXSETF)
00100000 – 6th alternate max green set active (MAXSETG)
01000000 – 7th alternate max green set active (MAXSETH)
10000000 – UTC forcing MAXSETB on a Pelican

52 UTCAIN – Accepted UTC Inputs

BAS:1 ENG 52 0:XXXXXXXX – UTC Control Word 1
ENG 52 1:XXXXXXXX – UTC Control Word 2
ENG 52 2:XXXXXXXX – UTC Control Word 3
ENG 52 3:XXXXXXXX – UTC Control Word 4

A '1' indicates that the controller has debounced that UTC control bit and the TC bit (if configured) is active.

53 UTCINF – UTC Conditions Influences

BAS:1 ENG 53 0:76543210 – UTC Switch facilities 7 to 0

54 UTCFOP – UTC Force Bits Present Flag

(ANY) ENG 54 0:11111111 => Force bits are present
ENG 54 0:00000000 => No force bits present

55 SBYENB – Standby Enabled Flag

BAS:1 ENG 55 0:76543210

A bit set '1' indicates that part-time mode is being requested on that particular stream (0 to 7).

CODE	DESCRIPTION

56 NOTAUT – Mode Select Switch Not In 'NORMAL' Position

(ANY) ENG 56 0:N

A non-zero value indicates that the 'VA', the 'FT' or the 'MANUAL' buttons on the manual panel are currently selected.

A zero value indicates that the 'NORMAL' button is currently selected.

58 CNDTMA – Conditioning Timers Active

BAS:3
```
ENG 58  0:10987654 32109876 54321098 76543210 – 31 to 0
ENG 58  4:32109876 54321098 76543210 98765432 – 63 to 32
ENG 58  8:54321098 76543210 98765432 10987654 – 95 to 64
ENG 58 12:76543210 98765432 10987654 32109876 - 127 to 96
ENG 58 16:98765432 10987654 32109876 54321098 – 159 to 128
ENG 58 20:10987654 32109876 54321098 76543210 – 191 to 160
ENG 58 24:32109876 54321098 76543210 98765432 – 223 to 192
ENG 58 28:54321098 76543210 98765432 10987654 – 255 to 224
ENG 58 32:76543210 98765432 10987654 32109876 – 287 to 256
ENG 58 36:98765432 10987654 32109876 54321098 – 319 to 288
ENG 58 40:10987654 32109876 54321098 76543210 – 351 to 320
ENG 58 44:32109876 54321098 76543210 98765432 – 383 to 352
ENG 58 48:54321098 76543210 98765432 10987654 – 415 to 384
ENG 58 52:76543210 98765432 10987654 32109876 – 447 to 416
ENG 58 56:98765432 10987654 32109876 54321098 - 479 to 448
```

A bit set to '1' indicates that the particular timer is active.

59 CNDPRV – Conditioning Timers Active on Last 200ms Cycle

BAS:3
```
ENG 59 0:10987654 32109876 54321098 76543210 – 31 to 0
ENG 59 4:32109876 54321098 76543210 98765432 – 63 to 32
ENG 59 8:54321098 76543210 98765432 10987654 – 95 to 64
.....................................................
ENG 59 56:98765432 10987654 32109876 54321098 – 479 to 448
```

A bit set to '1' indicates that the particular timer was active on last 200ms cycle.

For a complete list of the Conditioning Timers, refer to ENG 58.

CODE **DESCRIPTION**

60 AVLMDE – Available Mode Table

BAS:1
```
ENG 60 0:XXXXXXXX  - Not Used
ENG 60 1:XXXXXXXX  - Fixed Time
ENG 60 2:XXXXXXXX  - Vehicle Actuated
ENG 60 3:XXXXXXXX  - CLF (see handset command MTS)
ENG 60 4:XXXXXXXX  - Manual
ENG 60 5:XXXXXXXX  - Hurry
ENG 60 6:XXXXXXXX  - Urban Traffic Control
ENG 60 7:XXXXXXXX  - Part time
ENG 60 8:XXXXXXXX  - Start up
ENG 60 9:XXXXXXXX  - Not Used
ENG 60 10:XXXXXXXX - Manual Step On Mode
ENG 60 11:XXXXXXXX - Manual Panel Select Mode Switch
ENG 60 12:XXXXXXXX - Emergency Vehicle
ENG 60 13:XXXXXXXX - Bus Priority
```

A mode is not available if any bit is set to a '1'.

Note that '00010000' is set by the special conditioning mnemonics 'FTCONT', 'VACONT', etc. to disable the required mode.

62 MANIND – Manual Indications Table

BAS:1 A bit set to '1' indicates that the appropriate LED on the Manual Panel is illuminated.

The actual description of the function of the LED depends on the type of manual panel fitted, either Intersection or Stand-alone Pedestrian.

	Intersection	Stand-alone Ped.
ENG 62 0:00000001	Normal Mode	Stream 0 CPD
ENG 62 0:00000010	Manual Mode	Stream 0 CVE
ENG 62 0:00000100	Fixed Time Mode	Stream 0 VA Mode
ENG 62 0:00001000	VA Mode	Stream 0 FVP Mode
ENG 62 0:00010000	CLF Mode	DFM Reset Confirm
ENG 62 0:00100000	Auxiliary LED 3	Auxiliary LED 3
ENG 62 0:01000000	Awaiting Command	Not Used
ENG 62 0:10000000	Hurry Call Active	Not Used
ENG 62 1:00000001	All Red Confirm	Not Used
ENG 62 1:00000010	Button 1 Confirm	Stream 1 CPD
ENG 62 1:00000100	Button 2 Confirm	Not Used
ENG 62 1:00001000	Button 3 Confirm	Not Used
ENG 62 1:00010000	Button 4 Confirm	Stream 1 CVE
ENG 62 1:00100000	Button 5 Confirm	Not Used
ENG 62 1:01000000	Prohibited Move	Not Used
ENG 62 1:10000000	High Priority Mode	Stream 1 FVP Mode
ENG 62 2:00000001	Button 6 Confirm	Not Used
ENG 62 2:00000010	Button 7 Confirm	Stream 1 VA Mode
ENG 62 2:00000100	Auxiliary LED 1	Auxiliary LED 1
ENG 62 2:00001000	Auxiliary LED 2	Auxiliary LED 2
ENG 62 2:00010000	Not Used	Not Used
ENG 62 2:00100000	Not Used	Not Used
ENG 62 2:01000000	Not Used	Not Used
ENG 62 2:10000000	Cabinet Alarm	Cabinet Alarm

CODE **DESCRIPTION**

63 MANCND – Manual Controls Table Input Data

BAS:1 A bit set to '1' indicates that the appropriate input on the Manual Panel has been pressed (and latched if applicable).

The actual description of the function of the input depends on the type of manual panel fitted, either Intersection or Stand-alone Pedestrian.

	Intersection	Stand-alone Ped.
ENG 62 0:00000001	Normal Mode	Stream 0 CPD
ENG 62 0:00000010	Manual Mode	Stream 0 CVE
ENG 62 0:00000100	Fixed Time Mode	Stream 0 VA/FVP
ENG 62 0:00001000	VA Mode	Not Used
ENG 62 0:00010000	CLF Mode	DFM Reset Button
ENG 62 0:00100000	Spare Switch 3	Spare Switch 3
ENG 62 0:01000000	Not Used	Not Used
ENG 62 0:10000000	Signals On/Off	Signals On/Off
ENG 62 1:00000001	All Red Button	Not Used
ENG 62 1:00000010	Stage 1 Button	Stream 1 CPD
ENG 62 1:00000100	Stage 2 Button	Not Used
ENG 62 1:00001000	Stage 3 Button	Not Used
ENG 62 1:00010000	Stage 4 Button	Stream 1 CVE
ENG 62 1:00100000	Stage 5 Button	Not Used
ENG 62 1:01000000	Not Used	Not Used
ENG 62 1:10000000	Signals On/Off	Signals On/Off
ENG 62 2:00000001	Stage 6 Button	Not Used
ENG 62 2:00000010	Stage 7 Button	Stream 1 VA/FVP
ENG 62 2:00000100	Spare Switch 1	Spare Switch 1
ENG 62 2:00001000	Spare Switch 2	Spare Switch 2
ENG 62 2:00010000	Lamp Test Button	Lamp Test Button
ENG 62 2:00100000	Door Switch	Door Switch
ENG 62 2:01000000	Not Used	Not Used
ENG 62 2:10000000	Signals On/Off	Signals On/Off

65 MTCDEL – MTC Deleted Phases/Stages

BAS:3 ENG 65 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 65 4:10987654 32109876 54321098 76543210

A '1' indicates that the phase/stage has been deleted by the master time clock, i.e. the timetable.

67 LPSPRD – Lamp Supply is Present

(ANY) ENG 67 0:N

A zero value indicates that the lamp supply has dropped below the low lamp supply threshold, see LBT etc.

This value will remain unchanged while the lamp supply is switched off (using signals on/off switch for example). It is only updated while the lamp supply is switched on and voltage can be measured.

Also see 'ENG 177 – SWLMPS' which indicates whether the lamp supply is switched on or off.

CODE	DESCRIPTION

72 MANSEL – Manual Mode Selected Flag

(ANY) ENG 72 0:N

A non-zero value indicates that Manual Mode has been selected on the manual panel.

76 SSWMDE – Select Switch Mode

BAS:2 ENG 76 0:N

Shows the mode requested by the manual panel, i.e.

ENG 76 0:0 – Normal
ENG 76 0:1 – Fixed Time Mode
ENG 76 0:2 – VA Mode
ENG 76 0:3 – CLF Mode

Also see 'ENG 271 - SSWACT' which indicates whether the above mode is actually running on each of the streams.

77 MANMOP – Manual Mode Operational Flags

(ANY) ENG 77 0:N

A non-zero value indicates that manual mode is operational on at least one stream.

92 CLFFRC – CLF Forces

BAS:3 ENG 92 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 92 4:10987654 32109876 54321098 76543210

A '1' indicates that the phase/stage is being forced by the Cableless Link Facility.

93 CLFDEM – CLF Demands

BAS:3 ENG 93 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 93 4:10987654 32109876 54321098 76543210

A '1' indicates that the phase/stage is being demanded by the Cableless Link Facility.

94 CLFKEP – CLF Keeps

BAS:3 ENG 94 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 94 4:10987654 32109876 54321098 76543210

A '1' indicates that the phase/stage is to keep right of way for the Cableless Link Facility.

CODE **DESCRIPTION**

95 CLFRST – CLF Restricts

BAS:3
```
ENG 95 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 95 4:10987654 32109876 54321098 76543210
```

A ‘1’ indicates that the phase/stage is being prevented by the Cableless Link Facility.

96 CCSTT – Call/Cancel State

BAS:2
```
ENG 96 0:N – State of Call/Cancel Unit 0
ENG 96 1:N – State of Call/Cancel Unit 1
.....................................
ENG 96 7:N – State of Call/Cancel Unit 7
```

Where ‘N’ has the following meanings:
```
 0 – Unit idle
 1 – Input inactive (Unit idle)
 6 – Timing call delay
 7 – Timing call delay (restarted timer)
 8 – Output active (Unit idle)
10 – Input and Output active
13 – Timing cancel delay
15 – Timing cancel delay (restarted timer)
```

98 MNCMPL – Manual Compel

BAS:3
```
ENG 98 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 98 4:10987654 32109876 54321098 76543210
```

A ‘1’ indicates that the phase/stage is being requested in manual control for the stage button pressed.

99 FTCMPL – Fixed Time Compel

BAS:3
```
ENG 99 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 99 4:10987654 32109876 54321098 76543210
```

A ‘1’ indicates that the phase/stage is being requested by fixed time mode.

100 VRDMND – Vehicle Responsive: Demands Present

BAS:3
```
ENG 100 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 100 4:10987654 32109876 54321098 76543210
```

A ‘1’ indicates that the phase/stage is being demanded and includes demands from all sources when running in VA mode.

Also see:

ENG 27 – LATCHD	ENG 197 – UNLPUF
ENG 29 – PEDBUT	ENG 216 – WTCTRL
ENG 184 – PEDNOWAIT	ENG 256 – PBKLAT

CODE	DESCRIPTION

101 VRKEEP – Vehicle Responsive: Phases to Keep at ROW

BAS:3
```
ENG 101 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 101 4:10987654 32109876 54321098 76543210
```

A ‘1’ indicates that the phase/stage should be kept at right of way due to VA or SDE extensions.

102 VRKOVR – Vehicle Responsive: Keep Override

BAS:3
```
ENG 102 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 102 4:10987654 32109876 54321098 76543210
```

A ‘1’ indicates that the phase/stage should no longer be kept at right of way since its maximum green timer has expired.

103 VRREST – Vehicle Responsive: Restrictions (Prevents)

BAS:3
```
ENG 103 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 103 4:10987654 32109876 54321098 76543210
```

A ‘1’ indicates that the phase/stage should be prevented from appearing at right of way (by special conditioning).

104 NXTSTG – Next Stage

BAS:2
```
ENG 104 0:N – The next stage for stream 0
ENG 104 1:N – The next stage for stream 1
.....................................
ENG 104 7:N – The next stage for stream 7
```

The values seen here are the same as those seen by the ‘STS’ handset command.

105 CURSTG – Current Stage

BAS:2
```
ENG 105 0:N – The current stage for stream 0
ENG 105 1:N – The current stage for stream 1
.....................................
ENG 105 7:N – The current stage for stream 7
```

The values show the current stage active on the specified stream (as seen by the STS handset command).
Note that ‘255’ is displayed while the stream is between stages during a stage move.

CODE	DESCRIPTION

107 MODE – Displays Current Mode Number

BAS:2
```
ENG 107 0:N – The current mode for stream 0
ENG 107 1:N – The current mode for stream 1
.....................................
ENG 107 7:N – The current mode for stream 7
```

Where 'N' shows the current mode, i.e.

0 = Not Used	8 = Start Up
1 = Fixed Time	9 = Pelican FVP mode
2 = VA	10 = Not Used
3 = CLF	11 = Not Used
4 = Manual	12 = Emergency Vehicle
5 = Hurry	13 = Priority
6 = UTC	14 = Pelican VA mode
7 = Part Time	15 = Not Used

Note that Fixed Time to Current Maximums mode currently uses VA mode although the manual panel and the handset commands MOD and STS so the mode as Fixed Time.

108 FAZDIS – Phase Display Table

BAS:1
```
ENG 108  0:XXXXXXXX – Colours for Phase A
ENG 108  1:XXXXXXXX – Colours for Phase B
.....................................
ENG 108 31:XXXXXXXX – Colours for Phase F2
```

Where each bit indicates the following:
00000001 – Flashing Green
00000010 – Flashing Amber
00000100 – Flashing Red
00001000 – Not Used
00010000 – Green
00100000 – Amber / Wait Indicator
01000000 – Red
10000000 – Not Used

116 DFMINH – DFM Inhibit (Priority Units)

(ANY)
```
ENG 116 0:N – Priority Unit 0 Disable By DFM
ENG 116 1:N – Priority Unit 1 Disable By DFM
.....................................
ENG 116 7:N – Priority Unit 7 Disable By DFM
```

A non-zero value indicates that the specified priority unit has been disabled due to a fault being detected by the priority DFM system.

117 PRSTAT – Priority Status

BAS:1 ENG 117 0:76543210

A bit set to '1' indicates that there is a demand (or extensions) present for the priority unit (number 7 through to 0).

CODE **DESCRIPTION**

118 DSRACC – DSR Accepted State

(ANY) ENG 118 0:N

A non-zero value indicates that the handset has been plugged in.

119 CABCTL – Cabinet Alarm Control

BAS:1 ENG 119 0:XXXXXXXX

A bit set to '1' indicates which facility has requested the cabinet alarm (on the manual panel) indicator to be on.

00000001 – DFM fault (and not accepted, see ADF)
00001000 – Priority DFM fault
00010000 – Pelican local link failure

Also see 'ENG 147 – CABLMP' which indicates when special conditioning has requested the indicator on.

122 DFMFLT – Accepted DFM Faults

BAS:1 ENG 122 0:XXXXXXXX – I/O Port 0
ENG 122 1:XXXXXXXX – I/O Port 1
.....
ENG 122 30:XXXXXXXX – I/O Port 30

A bit set to '1' indicates that a DFM fault has been 'accepted' on that input bit on that port, also see the handset command ADF.

123 SDINAC – SDE/SA Card Inaccessible

(ANY) ENG 123 0:N

A non-zero value indicates that the SDE/SA card is not accessible.

124 TONORW – Phases Changing To No Right Of Way

BAS:3 ENG 124 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the phase is currently changing from 'at right of way' to 'not at right of way'. Also see page 215.

125 FZTMEX – Phase Terminating With Extensions Active

BAS:3 ENG 125 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the phase has just terminated with its extension timer still running.

126 TERGAP – Phases Terminating On A Gap

BAS:3 ENG 126 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the phase has just terminated and its extension timer was not running.

CODE	DESCRIPTION

127 XIGNDM – Extra I/G Demand For Phase By SDE

BAS:3 ENG 127 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that an SDE extra clearance request is active on that phase.

130 PRIINP – Priority Input Active

(ANY) ENG 130 0:N – Priority Unit 0
ENG 130 1:N – Priority Unit 1
.....
ENG 130 7:N – Priority Unit 7

A non-zero value indicates that the priority unit's input is currently active.

131 CURCOM – Current Compensation Times

BAS:2 ENG 131 0:N – Phase A
ENG 131 1:N – Phase B
.....
ENG 131 31:N – Phase F2

The value displayed for each phase is the compensation time that is currently being applied, i.e. being timed off. Note that the value displayed shows the required time and thus does not decrement.

132 PRIDEM – Priority Demands

(ANY) ENG 132 0:N – Priority Unit 0
ENG 132 1:N – Priority Unit 1
.....
ENG 132 7:N – Priority Unit 7

A non-zero value indicates that there is a demand for the priority unit.

133 PRIEXT – Priority Extensions

(ANY) ENG 133 0:N – Priority Unit 0
ENG 133 1:N – Priority Unit 1
.....
ENG 133 7:N – Priority Unit 7

A non-zero value indicates that there is a priority extension active for the priority unit.

134 INHENA – Inhibit Enable

(ANY) ENG 134 0:N – Priority Unit 0
ENG 134 1:N – Priority Unit 1
.....
ENG 134 7:N – Priority Unit 7

A non-zero value indicates that there is a priority inhibit timer should be enabled for the priority unit.

CODE **DESCRIPTION**

137 SKPCUR – Phases Skipped Or Curtailed

BAS:3 ENG 137 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Unit 0
ENG 137 4:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Unit 1
.....
ENG 137 28:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Unit 7

A bit set to '1' indicates the demanded phases that were skipped or extended phases that were curtailed, due to the priority movement of the priority unit.

143 PRLTCH – Priority Demand Latched

(ANY) ENG 143 0:N – Priority Unit 0
ENG 143 1:N – Priority Unit 1
.....
ENG 143 7:N – Priority Unit 7

A non-zero value indicates that there is a priority demand latched for the priority unit.

144 REVLCH – Revertive Priority Demand Latch

(ANY) ENG 144 0:N – Priority Unit 0
ENG 144 1:N – Priority Unit 1
.....
ENG 144 7:N – Priority Unit 7

A non-zero value indicates that a revertive demand for the priority unit has been latched.

146 SOFCND – Signals Off From Conditioning

(ANY) ENG 146 0:N

A non-zero value indicates that special conditioning has requested that the signals should be switched off.

Note that when special conditioning no longer requests the signals to be switched off, i.e. when this flag is cleared, the signals will switch on through the defined start-up sequence.

147 CABLMP – Cabinet Alarm Lamp Control

(ANY) ENG 147 0:N

A non-zero value indicates that special conditioning has requested that the cabinet alarm should be lit.

Also see 'ENG 119 – CABCTL' which indicates when the software has requested the indicator on.

149 SDEXOP – SDE Extensions Inhibit Mask

BAS:3 ENG 149 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that special conditioning is inhibiting the SDE extension on that phase.

CODE **DESCRIPTION**

150 DISMDE – Disabled Modes On Streams

BAS:1
```
ENG 150 0:76543210  - Not Used
ENG 150 1:76543210  - Fixed Time
ENG 150 2:76543210  - Vehicle Actuated
ENG 150 3:76543210  - CLF
ENG 150 4:76543210  - Manual
ENG 150 5:76543210  - Hurry
ENG 150 6:76543210  - Urban Traffic Control
ENG 150 7:76543210  - Part time
ENG 150 8:76543210  - Start up
ENG 150 9:76543210  - Not Used
ENG 150 10:76543210 – Manual Step On Mode
ENG 150 11:76543210 – VA/FT/CLF Selected On Man' Panel
ENG 150 12:76543210 – Emergency Vehicle
ENG 150 13:76543210 – Bus Priority
```

A bit set to '1' indicates that special conditioning has disabled the mode on that particular stream (0-7).

151 CNDARY – Special Conditioning Array

(ANY) ENG 151 0 ...

Special conditioning items are overlaid on this array so that the values can be read and written to from special conditioning.

152 FLFLGS – Fault Log Flags (Current Log)

BAS:2
```
ENG 152  0:N – Fault log flag 0
ENG 152  1:N – Fault log flag 1
.............................
ENG 152 63:N – Fault log flag 63
```

This array indicates currently active faults (or those that were detected as active on power-up and will not be re-tested until the next power-up). Whilst faults are set in this array, the corresponding fault log entry (as displayed on the handset using FLF or FFS) cannot be cleared, see section 4 starting on page 30.

153 FLDATA – Fault Log Data (Current Log)

BAS:1
```
ENG 153   0:XXXXXXXX – Fault log data byte 0
ENG 153   1:XXXXXXXX – Fault log data byte 1
.........................................
ENG 153 249:XXXXXXXX – Fault log data byte 249
```

The fault log data (FLD/FDS) associated with the fault log flags described in ENG 152.

PB801: FLD20 – FLD31 no longer store DFM faults.

154 TORW – Phases Changing To Right Of Way

BAS:3 ENG 154 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the phase is currently changing from to right of way. Also see page 215.

CODE **DESCRIPTION**

155 OIREQ – Phase And Stage Requests Per Mode

BAS:3 Phase/Stage requests for each mode:

```
FT:      ENG 155   8:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 155  12:10987654 32109876 54321098 76543210

VA:      ENG 155  16:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 155  20:10987654 32109876 54321098 76543210

CLF:     ENG 155  24:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 155  28:10987654 32109876 54321098 76543210

Manual:  ENG 155  32:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 155  36:10987654 32109876 54321098 76543210

Hurry:   ENG 155  40:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 155  44:10987654 32109876 54321098 76543210

UTC:     ENG 155  48:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 155  52:10987654 32109876 54321098 76543210

P/Time:  ENG 155  56:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 155  60:10987654 32109876 54321098 76543210

S/Up:    ENG 155  64:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 155  68:10987654 32109876 54321098 76543210

FVP:     ENG 155  72:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 155  76:10987654 32109876 54321098 76543210

StepOn:  ENG 155  80:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 155  84:10987654 32109876 54321098 76543210

Em/Veh:  ENG 155  96:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 155 100:10987654 32109876 54321098 76543210

Prior:   ENG 155 104:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 155 108:10987654 32109876 54321098 76543210

Pel/VA:  ENG 155 112:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
         ENG 155 116:10987654 32109876 54321098 76543210
```

156 OIKEEP – Phase And Stage Keeps Per Mode

BAS:3 Phases/stages to keep right of way, e.g. due to VA extension timers, for each mode.

Format as for ENG 155 (OIREQ).

157 OIKEOR – Phase And Stage Keep Overrides Per Mode

BAS:3 Phases/stages with keeps overridden, e.g. due to max timers expiring, for each mode.

Format as for ENG 155 (OIREQ).

CODE **DESCRIPTION**

158 OIREST – Phase And Stage Restrictions Per Mode

BAS:3 Phases/stages restricted, e.g. by special conditioning or the master time clock, for each mode.

Format as for ENG 155 (OIREQ).

159 OICDEM – Operational Influences Combined Phase Demands

BAS:3 ENG 159 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 159 4:10987654 32109876 54321098 76543210

Operational influences (OIDEM) combined using the modes actually running on each of the streams.

160 OICREQ – Operational Influences Combined Phase Request

BAS:3 ENG 160 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 160 4:10987654 32109876 54321098 76543210

Operational influences (OIREQ) combined using the modes actually running on each of the streams.

161 OICKEEP – Operational Influences Combined Phase Keeps

BAS:3 ENG 161 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 161 4:10987654 32109876 54321098 76543210

Operational influences (OIKEEP) combined using the modes actually running on each of the streams.

162 OICKEOR – Operational Influences Combined Keep Override

BAS:3 ENG 162 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 162 4:10987654 32109876 54321098 76543210

Operational influences (OIKEOR) combined using the modes actually running on each of the streams.

163 OICREST – Operational Influences Combined Restrictions

BAS:3 ENG 163 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 163 4:10987654 32109876 54321098 76543210

Operational influences (OIREST) combined using the modes actually running on each of the streams.

164 TMRSEC – Timer Seconds Array

BAS:2 ENG 164 0:N – Seconds left in timer 0
ENG 164 1:N – Seconds left in timer 1
Etc...

CODE **DESCRIPTION**

These timers are used by various facilities within the controller and are allocated as follows:

```
   0 to 31  = 32 Phase minimum green timers
  32 to 63  = 32 Phase green extension timers
  64 to 95  = 32 Phase green maximum timers
  96 to 127 = 32 Phase delay timers
 128 to 159 = 32 Phase lamp sequencing timers
 160 to 191 = 32 Phase intergreen timers
 192 to 223 = 32 Phase secondary intergreen timers
 224 to 231 =  8 Hurry call delay timers
 232 to 239 =  8 Hurry call hold timers
 240 to 247 =  8 Hurry call prevent timers
 248 to 255 =  8 Call/Cancel timers
 256 to 263 =  8 Priority extension timers
 264 to 271 =  8 Priority maximum timers
 272 to 279 =  8 Priority inhibit timers
 280 to 284 =  5 Internal timers
 285 to 316 = 32 Phase priority compensation timers
 317 to 324 =  8 Fixed time timers
 325 to 332 =  8 Pedestrian window timers
 333 to 340 =  8 Hold intergreen maximum timers
 341 to 348 =  8 Hold intergreen extension timers
 349 to 356 =  8 Supplementary intergreen ext. timers
 357 to 364 =  8 Supplementary intergreen max. timers
 365 to 396 = 32 Conditioning timers  0 to 31
 397 to 428 = 32 Conditioning timers 32 to 63
 429 to 460 = 32 Conditioning timers 64 to 95
 461 to 468 =  8 Manual step-on timers
 469 to 724 = 256 Input extension timers
 725 to 756 = 32 Push-button demand extension timers
 757 to 788 = 32 Pedestrian demand delay timers
 789 to 820 = 32 Conditioning timers 96 to 127
 821 to 852 = 32 Conditioning timers 128 - 159
 853 to 884 = 32 Conditioning timers 160 – 191
 885 to 916 = 32 Conditioning timers 192 – 223
 917 to 948 = 32 Conditioning timers 224 – 255
 949 to 980 = 32 Conditioning timers 256 – 287
 981 to 1012 = 32 Conditioning timers 288 – 319
1013 to 1044 = 32 Conditioning timers 320 – 351
1045 to 1076 = 32 Conditioning timers 352 to 383
1077 to 1108 = 32 Conditioning timers 384 to 415
1109 to 1140 = 32 Conditioning timers 416 to 447
1141 to 1172 = 32 Conditioning timers 448 to 479
```

Also see ‘ENG 165 – TMRSTU’ which shows the sub-seconds and status flags for each timer.

CODE	DESCRIPTION
165	TMRSTU – Timer Status Array
BAS:1	ENG 165 0:XXXXXXXX – Status of timer 0 ENG 165 1:XXXXXXXX – Status of timer 1 Etc...

This array holds the sub-seconds and status flags for each of the timers described in ENG 164 where each bit has the following meaning:

-----000 = Timer sub-seconds value 0.0 seconds
-----001 = Timer sub-seconds value 0.2 seconds
-----010 = Timer sub-seconds value 0.4 seconds
-----011 = Timer sub-seconds value 0.6 seconds
-----100 = Timer sub-seconds value 0.8 seconds

001----- = Timer active flag
010----- = Timer held flag
100----- = Timer expired flag

CODE **DESCRIPTION**

167 SCRTCH – Scratch Pad For Special Conditioning

BAS:1 OR BAS:2

This area is used special conditioning for its scratch bits, etc., which have been allocated as follows:

```
ENG 167  0:76543210 – Scratch Bits: SCRT0 to SCRT7
ENG 167  1:54321098 – Scratch Bits: SCRT8 to SCRT15

ENG 167  2:76543210 – Rough Bits: ROUGH0 to ROUGH7
ENG 167  3:54321098 – Rough Bits: ROUGH8 to ROUGH15
```

The following blocks can either be accessed as scratch bits, 1SCRT0, etc., which are best viewed using BAS:1, or as scratch bytes, 1SCRTCH0, etc., which are best viewed using BAS:2

```
                              SCRATCH BITS          BYTES
ENG 167  4:76543210 – 1SCRT0   to 1SCRT7   or 1SCRTCH0
ENG 167  5:54321098 – 1SCRT8   to 1SCRT15  or 1SCRTCH1
ENG 167  6:32109876 – 1SCRT16  to 1SCRT23  or 1SCRTCH2
ENG 167  7:10987654 – 1SCRT24  to 1SCRT31  or 1SCRTCH3
ENG 167  8:98765432 – 1SCRT32  to 1SCRT39  or 1SCRTCH4
ENG 167  9:76543210 – 1SCRT40  to 1SCRT47  or 1SCRTCH5
ENG 167 10:54321098 – 1SCRT48  to 1SCRT55  or 1SCRTCH6
ENG 167 11:32109876 – 1SCRT56  to 1SCRT63  or 1SCRTCH7
ENG 167 12:10987654 – 1SCRT64  to 1SCRT71  or 1SCRTCH8
ENG 167 13:98765432 – 1SCRT72  to 1SCRT79  or 1SCRTCH9
ENG 167 14:76543210 – 1SCRT80  to 1SCRT87  or 1SCRTCH10
ENG 167 15:54321098 – 1SCRT88  to 1SCRT95  or 1SCRTCH11
ENG 167 16:32109876 – 1SCRT96  to 1SCRT103 or 1SCRTCH12
ENG 167 17:10987654 – 1SCRT104 to 1SCRT111 or 1SCRTCH13
ENG 167 18:98765432 – 1SCRT112 to 1SCRT119 or 1SCRTCH14
ENG 167 19:76543210 – 1SCRT120 to 1SCRT127 or 1SCRTCH15
ENG 167 20:54321098 – 1SCRT128 to 1SCRT135 or 1SCRTCH16
ENG 167 21:32109876 – 1SCRT136 to 1SCRT143 or 1SCRTCH17
ENG 167 22:10987654 – 1SCRT144 to 1SCRT151 or 1SCRTCH18
ENG 167 23:98765432 – 1SCRT152 to 1SCRT159 or 1SCRTCH19
ENG 167 24:76543210 – 1SCRT160 to 1SCRT167 or 1SCRTCH20
ENG 167 25:54321098 – 1SCRT168 to 1SCRT175 or 1SCRTCH21
ENG 167 26:32109876 – 1SCRT176 to 1SCRT184 or 1SCRTCH22
ENG 167 27:10987654 – 1SCRT184 to 1SCRT192 or 1SCRTCH23
ENG 167 28:98765432 – 1SCRT192 to 1SCRT199 or 1SCRTCH24
ENG 167 29:76543210 – 1SCRT200 to 1SCRT207 or 1SCRTCH25
ENG 167 30:54321098 – 1SCRT208 to 1SCRT215 or 1SCRTCH26
ENG 167 31:32109876 – 1SCRT216 to 1SCRT223 or 1SCRTCH27
ENG 167 32:10987654 – 1SCRT224 to 1SCRT231 or 1SCRTCH28
ENG 167 33:98765432 – 1SCRT232 to 1SCRT239 or 1SCRTCH29
ENG 167 34:76543210 – 1SCRT240 to 1SCRT247 or 1SCRTCH30
ENG 167 35:54321098 – 1SCRT248 to 1SCRT255 or 1SCRTCH31
```

Continued overleaf...

CODE **DESCRIPTION**

167 (CONT.) Following that block of 32 scratch bytes (256 scratch bits) is a second identically structured block giving even more scratch bits and bytes...

	SCRATCH BITS		BYTES
ENG 167 36:76543210 –	2SCRT0	to 2SCRT7	or 2SCRTCH0
ENG 167 37:54321098 –	2SCRT8	to 2SCRT15	or 2SCRTCH1
ENG 167 38:32109876 –	2SCRT16	to 2SCRT23	or 2SCRTCH2
ENG 167 39:10987654 –	2SCRT24	to 2SCRT31	or 2SCRTCH3
ENG 167 40:98765432 –	2SCRT32	to 2SCRT39	or 2SCRTCH4
ENG 167 41:76543210 –	2SCRT40	to 2SCRT47	or 2SCRTCH5
ENG 167 42:54321098 –	2SCRT48	to 2SCRT55	or 2SCRTCH6
ENG 167 43:32109876 –	2SCRT56	to 2SCRT63	or 2SCRTCH7
ENG 167 44:10987654 –	2SCRT64	to 2SCRT71	or 2SCRTCH8
ENG 167 45:98765432 –	2SCRT72	to 2SCRT79	or 2SCRTCH9
ENG 167 46:76543210 –	2SCRT80	to 2SCRT87	or 2SCRTCH10
ENG 167 47:54321098 –	2SCRT88	to 2SCRT95	or 2SCRTCH11
ENG 167 48:32109876 –	2SCRT96	to 2SCRT103	or 2SCRTCH12
ENG 167 49:10987654 –	2SCRT104	to 2SCRT111	or 2SCRTCH13
ENG 167 50:98765432 –	2SCRT112	to 2SCRT119	or 2SCRTCH14
ENG 167 51:76543210 –	2SCRT120	to 2SCRT127	or 2SCRTCH15
ENG 167 52:54321098 –	2SCRT128	to 2SCRT135	or 2SCRTCH16
ENG 167 53:32109876 –	2SCRT136	to 2SCRT143	or 2SCRTCH17
ENG 167 54:10987654 –	2SCRT144	to 2SCRT151	or 2SCRTCH18
ENG 167 55:98765432 –	2SCRT152	to 2SCRT159	or 2SCRTCH19
ENG 167 56:76543210 –	2SCRT160	to 2SCRT167	or 2SCRTCH20
ENG 167 57:54321098 –	2SCRT168	to 2SCRT175	or 2SCRTCH21
ENG 167 58:32109876 –	2SCRT176	to 2SCRT184	or 2SCRTCH22
ENG 167 59:10987654 –	2SCRT184	to 2SCRT192	or 2SCRTCH23
ENG 167 60:98765432 –	2SCRT192	to 22CRT199	or 2SCRTCH24
ENG 167 61:76543210 –	2SCRT200	to 2SCRT207	or 2SCRTCH25
ENG 167 62:54321098 –	2SCRT208	to 2SCRT215	or 2SCRTCH26
ENG 167 63:32109876 –	2SCRT216	to 2SCRT223	or 2SCRTCH27
ENG 167 64:10987654 –	2SCRT224	to 2SCRT231	or 2SCRTCH28
ENG 167 65:98765432 –	2SCRT232	to 2SCRT239	or 2SCRTCH29
ENG 167 66:76543210 –	2SCRT240	to 2SCRT247	or 2SCRTCH30
ENG 167 67:54321098 –	2SCRT248	to 2SCRT255	or 2SCRTCH31

168 FLAFLF – Fault Log Flags Active To Cause Flashing

(ANY) ENG 168 0:N

A non-zero value indicates that a fault is set in the fault log, which has been configured to extinguish the signals and switch on the fail flasher.

Note that the firmware just extinguishes the signals. Special conditioning is required to actually switch on the fail flasher if required.

169 FLFCOM – Fault Log Flags Combination Set

(ANY) ENG 169 0:N

A non-zero value indicates that faults are set in the fault log which have been configured to perform special events controlled by special conditioning, e.g. to return a modified controller fault ‘CF’ reply bit.

CODE **DESCRIPTION**

170 PRD1EX – 1st Priority Delay Timer Expired Flag

BAS:1 ENG 170 0:76543210

A bit set to '1' indicates the priority units on which 1st delay timers have expired.

175 FRETIM – Number Of Times Free Time Was Set To Zero

BAS:2 ENG 175 0:N

Displays the number of times that the processor free time, as seen by FRE0, has dropped to 0%. Used internally to set the watchdog fault FLF 8.

176 SYSLED – System Error LED Status

(ANY) ENG 176 0:N

A non-zero value indicates that the system error LED is requested to be on, i.e. there is an active fault in the fault log.

177 SWLMPS – Software Lamp State Flag

(ANY) ENG 177 0:N

A non-zero value indicates the software expects the lamp supply to be on. This normally matches the 'LMPON' requested state except for slight delays in switching the lamp supply relays on and off and during a relay test (see 'RRT') when 'SWLMPS' will show the supply switching off temporarily.

Also see:

'ENG 67 – LPSPRD' which indicates whether the lamp supply is present, i.e. is not too low, and

'ENG 188 – LMPON' which indicates the lamp supply state requested by the software.

180 CNGTYP – Red To Green Change Type For Pelican Ped

BAS:2 ENG 180 0:N – Change type for stream 0
ENG 180 1:N – Change type for stream 1
.....
ENG 180 7:N – Change type for stream 7

This array is set up by the vehicle responsive module to indicate which type of stage change is in progress on the pelican stream. The values are used by the lamp sequencing module to select the appropriate PAR all red time:

Value	Stage Change Type
0	Gap change in VA mode
1	MAX change in VA mode
2	FVP mode
3	UTC active
4	Local link/CLF window active

CODE **DESCRIPTION**

182 SCINH – Pelican UTC Vehicle Extension Inhibit

BAS:3 ENG 182 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the UTC vehicle Extension Inhibit (SC) is active on the vehicle phase of a stand-alone pedestrian stream. Set up by Special Conditioning.

183 LLDMD – Pelican Local Link Pedestrian Demands

BAS:3 ENG 183 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

Where a bit set to '1' indicates a local link pedestrian demand for that particular phase.

184 PEDNOWAIT – Ped. Demands Which Do Not Light The Waits

BAS:3 ENG 184 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates a pedestrian demand (from special conditioning) that does not light the wait indicator on that phase.

Also see:

ENG 27 – LATCHD	ENG 197 – UNLPUF
ENG 29 – PEDBUT	ENG 216 – WTCTRL
ENG 100 - VRDMND	ENG 256 – PBKLAT

187 RLMMSK – Phase Masked Out By Red Lamp Monitoring

BAS:3 ENG 187 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '0' indicates that the phase has been blacked-out following a 2nd red lamp fault.

Also see 'ENG 215 – LMUINH' for phases inhibited by red lamp monitoring.

188 LMPON – Lamp On/Off Request

(ANY) ENG 118 0:N

A non-zero value indicates that the software is requesting the lamp supply should be switched on.

Also see:

'ENG 67 – LPSPRD' which indicates whether the lamp supply is present, i.e. is not too low, and

'ENG 177 – SWLMPS' which indicates whether the lamp supply is switched on or off.

CODE	DESCRIPTION

189 LMPDIM – Lamp Dim/Bright Request

(ANY) ENG 189 0:N

A non-zero value indicates that the software is requesting the lamp supply to be dimmed.

190 UTCINH – UTC Pedestrian And Extension Inhibit

BAS:3 ENG 190 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that demands and extensions for that phase are inhibited, normally used by the pelican PV bit.

191 LNKINH – Local Link Ped. Demand And Extension Inhibit

BAS:3 ENG 191 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

As 'ENG 190 – UTCINH', except this is due to the local link PV1 input.

192 CLFINH – CLF Pedestrian Inhibit

BAS:3 ENG 192 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set '1' indicates that the pedestrian phase has been inhibited by the CLF inhibit pedestrian phase influence.

194 PRSLMP – Present Street Lamp States

BAS:3 ENG 194 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Reds
ENG 194 4:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Ambers
ENG 194 8:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Greens

A bit set to '1' indicates that the phase and colour has been requested on. Also see "ENG 268 – PRSFLS".

Note that this information will reflect any flashing state as occurring on the street and if the signals are switched off, the display will be all zeros.

195 SPCMPL – Step On Compel

BAS:3 ENG 195 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA
ENG 195 4:10987654 32109876 54321098 76543210

A bit set to '1' shows the demanded phases (usually none) and stages (usually the next stage) used by the manual step-on facility.

CODE **DESCRIPTION**

196 ALTDFM – Alternative DFM Timeset Selected Flags

BAS:1 ENG 196 0:00000XXX

This item shows which alternate DFM timeset is currently active:

00000000 – DFM timeset A is active
00000001 – DFM timeset B is active
00000010 – DFM timeset C is active
00000100 – DFM timeset D is active

197 UNLPUF – Unlatched Puffin Phased Demands

BAS:3 ENG 197 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that there is an unlatched 'Puffin' demand for that pedestrian phase, i.e. a demand processed using kerbside detector inputs and/or a pedestrian demand delay.

Also see:
ENG 27 – LATCHD
ENG 29 – PEDBUT
ENG 100 - VRDMND
ENG 184 – PEDNOWAIT
ENG 216 – WTCTRL
ENG 256 – PBKLAT

211 RLM_DELAY_STATE – Enhanced RLM Phase Delays Running

BAS:3 ENG 211 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the red lamp monitoring facility is currently delaying the phase.

215 LMUINH – Phases Inhibited By Red Lamp Monitoring

BAS:3 ENG 215 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the red lamp monitoring facility is currently inhibiting the phase.

Also see 'ENG 240 – LMUSTG' for the stages inhibited and 'ENG 187 – RLMMSK' for phases blacked out by red lamp monitoring.

216 WTCTRL – Wait Indicator Control

BAS:3 ENG 216 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates the phase's wait indicator is being requested on, either by special conditioning or by the firmware. However, demands handled by PBKLAT do not appear in WTCTRL.

Also see:
ENG 27 – LATCHD
ENG 29 – PEDBUT
ENG 100 – VRDMND
ENG 184 – PEDNOWAIT
ENG 197 – UNLPUF
ENG 256 – PBKLAT

CODE	DESCRIPTION
218	ENT_TIM_CTRL – CLF Entry Timer Control Indication
BAS:2	ENG 218 0:N
	This value shows the state of the CLF entry timer: ENG 218 0:0 – Entry timer is idle ENG 218 0:1 – Entry timer is active ENG 218 0:2 – Entry timer has terminated
219	EXIT_TIM_CTRL – CLF Exit Timer Control Indication
BAS:2	ENG 219 0:N
	This value shows the state of the CLF exit timer: ENG 219 0:0 – Exit timer is idle ENG 219 0:1 – Exit timer is active ENG 219 0:2 – Exit timer has terminated
226	pbus – Phase Bus Interface Items
(VARIOUS)	This ENG code contains various items to do with the main processor's interface to the phase bus processor. Many items are only of use to Siemens Engineering, however some may be useful and these are explained below:
226.4	pbus.synchronised_to_ZXO
(ANY)	ENG 226 4:N
	A non-zero value indicates that the phase bus processor has synchronised to the mains' zero crossover signal.
226.7	pbus.allow_mains_sync_RTC
(ANY)	ENG 226 7:N
	A zero value indicates that the real time clock has been forced to run crystal synchronisation (even though mains' synchronisation is required by CTS) due to the phase bus processor losing mains' synchronisation. It will automatically revert to mains' synchronisation once the phase bus processor has successfully re-synchronised to the mains.
226.12	pbus.dim_requested
(ANY)	ENG 226 12:N
	A non-zero value indicates that the solar cell is requesting that the lamps should be dimmed.

CODE	DESCRIPTION

226.16 pbus.requested_triacs

BAS:3 ENG 226 16:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Reds
ENG 226 20:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Ambers
ENG 226 24:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Greens

A bit set to '1' indicates that the triac (and thus the LED on the front of the lamp switch cards) has been requested on.

226.32 pbus.actual_lamps_pos

BAS:3 ENG 226 32:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Reds
ENG 226 36:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Ambers
ENG 226 40:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Greens

A bit set to '1' indicates that the signal was detected as on during the positive mains half cycle.

226.44 pbus.actual_lamps_neg

BAS:3 ENG 226 44:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Reds
ENG 226 48:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Ambers
ENG 226 52:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Greens

A bit set to '1' indicates that the signal was detected as on during the negative mains half cycle.

226.131 pbus.mon_val_error_count

ENG 226 131:N

BAS:2

This item is the error counter used to confirm a fault with the monitor validation system.

It is incremented when a test fails and decremented when a test passed.

Note that the item is in fact a two-byte word held in offsets 130 and 131. Therefore, on the simulator running on an Intel processor use ENG 226 130 instead.

226.133 pbus.cor_off_error_count

ENG 226 133:N

BAS:2

This item is the error counter used to confirm a correspondence (or 'equivalence' fault) which has been configured to switch off the signals.

It is incremented when a test fails and decremented when a test passed.

Note that the item is in fact a two-byte word held in offsets 132 and 133. Therefore, on the simulator running on an Intel processor use ENG 226 132 instead.

CODE	DESCRIPTION
226. 135 BAS:2	pbus.cor_mon_error_count ENG 226 135:N This item is the error counter used to confirm a correspondence (or ‘equivalence’ fault) that is configured to be monitored, but not to switch off the signals; i.e. a fault is logged only. It is incremented when a test fails and decremented when a test passed. Note that the item is in fact a two-byte word held in offsets 134 and 135. Therefore, on the simulator running on an Intel processor use ENG 226 134 instead.
226. 137 BAS:2	pbus.cor_max_error_count ENG 226 137:N This item is the largest value recorded in either of the correspondence error counters described previously. Note that the item is in fact a two-byte word held in offsets 136 and 137. Therefore, on the simulator running on an Intel processor use ENG 226 136 instead.
226. 180 BAS:3	pbus.bad_flashing_greens ENG 226 180:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA Non UK facility only - A bit set to ‘1’ indicates that the phase green has been detected stuck on when it should be flashing. These aspects will remain on steady for the rest of their flashing period.
226. 196 BAS:2	pbus.aud_mon1_errors and aud_mon2_errors ENG 226 196:N – Monitor 1 – Channel 1 ENG 226 197:N – Monitor 1 – Channel 2 ENG 226 198:N – Monitor 2 – Channel 1 ENG 226 199:N – Monitor 2 – Channel 2 These counters count the total number of times that any sample has not matched the expected state. Also see the fault flags FLF45 and FLF46.
227 (VARIOUS)	dprcpy – Dual Port RAM Copy The Dual Port RAM is the area of shared memory between the controller’s main processor and the phase bus processor used to pass messages between the two. This item allows the messages received from the phase bus processor to be examined. Many items are only of use to Siemens Engineering, however some may be useful and these are explained below:

CODE	DESCRIPTION
227.0	dprcpy.compatibility
BAS:2	ENG 227 0:X ENG 227 1:Y These items show the phase bus processor's major (X) and minor (Y) compatibility numbers. Currently the only value of 'X' accepted by the main processor is '1'. The value of 'Y' indicates the optional features available in the phase bus processor firmware. If the compatibility values are not correct, FLF 2:253 is logged, see page 38.
227.14	dprcpy.rep.message_code
BAS:2	ENG 227 14:N This item shows the message code number. The only valid message code currently expected by main processor is '10' otherwise the message is ignored and the counter in ENG 235 is incremented.
227.15	dprcpy.rep.watchdog
BAS:2	ENG 227 15:N This item is incremented by the phase bus processor in each message to show that it is still functioning; otherwise the main processor would ignore the message and increment the counter in ENG 235.
227.16	dprcpy.rep.state
BAS:2	ENG 227 16:N This item shows the running state of the phase bus processor. Currently defined states are: 1 – Start-up mains averaging 2 – Start-up waiting for go from main processor 3 – Start-up fast config check 4 – System active
227.18	dprcpy.rep.zxo_missed
(ANY)	ENG 227 18:N A non-zero value indicates that the phase bus processor 'missed', i.e. did not detect, the mains zero crossover signal on the previous mains cycle. Also see ENG 235 14.

CODE	DESCRIPTION
227.44	dprcpy.rep.curr_red1
BAS:2	ENG 227 44:N – Phase A ENG 227 45:N – Phase B ..... ENG 227 75:N – Phase F2
	These values show the last red current readings for the first channels of phases A to F2. The value would normally be '255' if one or more lamps were connected.
227.76	dprcpy.rep.curr_red2
BAS:2	ENG 227 76:N – Phase A ENG 227 77:N – Phase B ..... ENG 227 107:N – Phase F2
	These values show the last red current readings for the second channels of phases A to F2. The value would normally be '255' if one or more lamps were connected.
227.110	dprcpy.rep.tot_curr
BAS:2	ENG 227 110/1:N – Sensor 1 (Normally Phase A) ENG 227 112/3:N – Sensor 2 (Normally Phase B) ..... ENG 227 172/3:N – Sensor 32 (Normally Phase F2)
	These 16-bit words show the live current readings taken on each of the 32 on-board sensors where a count of 217 is normally equivalent to 1 Amp rms. Unlike KES (which only shows the readings actually processed by the lamp monitor) these readings are taken continuously, regardless of the state of the signals.
227.176	dprcpy.rep.analog
BAS:2	ENG 227 176/7:N – Sensor 33 196/7:N – Sensor 41 ENG 227 178/9:N – Sensor 34 198/9:N – Sensor 42 ENG 227 180/1:N – Sensor 35 200/1:N – Sensor 43 ENG 227 182/3:N – Sensor 36 202/3:N – Sensor 44 ENG 227 184/5:N – Not Used 204/5:N – Not Used ENG 227 186/7:N – Sensor 37 206/7:N – Sensor 45 ENG 227 188/9:N – Sensor 38 208/9:N – Sensor 46 ENG 227 190/1:N – Sensor 39 210/1:N – Sensor 47 ENG 227 192/3:N – Sensor 40 212/3:N – Sensor 48 ENG 227 194/5:N – Not Used
	These 16-bit words show the live current readings taken on each of the 16 external sensors where a count of 217 is normally equivalent to 1 Amp rms. Unlike KES (which only shows the readings actually processed by the lamp monitor) these readings are taken continuously, regardless of the state of the signals. Note: On the ST700, the readings for sensors 37 to 40 are returned as ENG 227 76, 77, 78 and 79.

CODE	DESCRIPTION
227. 224 BAS:2	dprcpy.rep.adc_test These values show the results from the ADC tests which the phase bus processor has performed on each of the lamp switch cards at both the positive and negative mains peaks. The data starts at offset 244 with the negative peak readings for the first lamp switch card: ENG 227 224/5:N – Test 0.0v – Card 0 – Negative Peak ENG 227 226/7:N – Test 2.5v – Card 0 – Negative Peak ENG 227 228/9:N – Test 5.0v – Card 0 – Negative Peak The positive peak readings for this card start at: ENG 227 230/1:N – Test 0.0v – Card 0 – Positive Peak And the readings for the other three cards start at: ENG 227 236/7:N – Test 0.0v – Card 1 – Negative Peak ENG 227 248/9:N – Test 0.0v – Card 2 – Negative Peak ENG 227 260/1:N – Test 0.0v – Card 3 – Negative Peak
228 BAS:3	cor_errors_confirmed – Correspondence Errors Confirmed ENG 228 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Reds ENG 228 4:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Ambers ENG 228 8:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Greens A bit set ‘1’ indicates that a correspondence fault has been logged against that phase and colour, but the controller has been configured to continue normal operation, i.e. problems with the reds, ambers or switched signs, but not the greens. Also see the description of FLF 3 on page 39.

CODE **DESCRIPTION**

229 relaytest – Relay Test Information

BAS:2

This item displays information about the progress of the lamp supply relay test; see FLF 4 on page 42.

```
ENG 229  0:N – Same as the RRT handset command
ENG 229  1:N – Relay test state*
ENG 229  2:N – Error counter used to confirm a fault
ENG 229  4:N \ Countdown timer used to time to the next
ENG 229  5:N / relay test (units are 1/5th of a second)
ENG 229  6:N \ First lamp supply reading
ENG 229  7:N /
ENG 229  8:N \ Second lamp supply reading
ENG 229  9:N /
ENG 229 10:N \ Third lamp supply reading
ENG 229 11:N /
ENG 229 12:N – ST700 audible error counter**
ENG 229 13:XXXXX11X \  Audible samples: bits 1 and 2
ENG 229 14:XXXXX11X  > should be '1' in all samples.
ENG 229 15:XXXXX11X /  (Best viewed using BAS:1)
```

```
* The commonly displayed states are detailed below:
 1 – SSR test is next, waiting on the timer
 2 – SSR test is next, confirming signals on
 6 – Relay A test is next, waiting on the timer
 7 – Relay A test is next, confirming signals on
11 – Relay B test is next, waiting on the timer
12 – Relay B test is next, confirming signals on
16 – Relay test complete, idle state
```

** The first switch in the audible/tactile circuits of the ST700 is controlled in parallel to relay A and thus is also checked during the relay test of relay A. If it appears to be stuck closed, the fault "FLF 45:255, FLD 72:00010001" will be logged.

230 background_checksum_counter – Monitor CRC Routines

BAS:2

```
ENG 230 0:N – Firmware PROM
ENG 230 1:N – Configuration PROM
ENG 230 2:N – RAM junction config. Data
ENG 230 3:N – RAM timing config. Data
```

Each byte counter is incremented after each block of either PROM or RAM within each particular area has been read by the background checksum routines.

231 LMPMON_flashing_config_fault

BAS:2 ENG 231 0:N

This item counts the number of times monitoring of a flashing aspect by one or more of the sensors had to be aborted because too many were flashing simultaneously.

CODE **DESCRIPTION**

232 LMPMON_confirmed_drops – Confirmed Lamp Faults

BAS:2 ENG 232 2:N – Sensor 1, i.e. Phase A
ENG 232 4:N – Sensor 2, i.e. Phase B
.....
ENG 232 64:N – Sensor 32, i.e. Phase F2

These values show the number of load drops that the lamp monitor has confirmed on each phase's red, i.e. how many times the lamp monitor has confirmed a drop in current.

The red lamp monitor uses this information to help it distinguish between a 1st and a 2nd red lamp failure; i.e. two or more confirmed drops in current will generate a 2nd red lamp fault.

Note that the red lamp monitor will also generate a 2nd red lamp fault if the load dropped, i.e. the value in KLD, is more than 150% of configured maximum size of any red lamp.

233 stack_frame – Stack Dump On Fatal Error

BAS:0 ENG 233 2:NN – Most significant byte
ENG 233 3:NN
ENG 233 4:NN
ENG 233 5:NN – Least significant byte

The four-byte value above is normally the address of the offending instruction. This item is only of use by Siemens Engineering following a serious internal error.

234 pbusflt – Full Phase Bus Fault Data

BAS:2 ENG 234 0:N – Fault Code (Same as FLF 2)
ENG 234 1:N – Fault Data Byte 0 (Same as FLD 10)
ENG 234 2:N – Fault Data Byte 1 (Same as FLD 11)
ENG 234 3:N – Fault Data Byte 2 (Same as FLD 12)
ENG 234 4:N – Fault Data Byte 3 (Not recorded in FLD)
.....
ENG 234 20:N – Fault Data Byte 19 (Not recorded in FLD)
ENG 234 21:N – Fault Checksum

This item holds the complete fault information message received from the phase bus processor since only the fault code and the first three bytes of fault data are actually recorded in the controller's fault log.

This extra information is only of use to Siemens Engineering.

CODE	DESCRIPTION

235 pbuso – Phase Bus Data Not Cleared By Power Off/On

BAS:2 This item contains various pieces of information that are not initialised on power off/on (unlike 'pbus' see ENG 226).

The first three items are counters that are incremented when...

ENG 235 0:N – monitor validation is pulsed
ENG 235 1:N – any message (valid or not) is received from the phase bus processor
ENG 235 2:N – the mains peak interrupt runs

The following items display information about the low lamp supply facility...

ENG 235 3:N – Non-zero when lamp supply is too low.

ENG 235 4:N \ Supply restoration confirmation timer
ENG 235 5:N / incremented every mains cycle.

ENG 235 6:N \ Supply failure confirmation timer again
ENG 235 7:N / incremented every mains cycle.

The following items are count the number of messages received from the phase bus processor with...

ENG 235 8:N \ Watchdog counter did not change.
ENG 235 9:N /

ENG 235 10:N \ Update in progress, e.g. main processor
ENG 235 11:N / slow to accepted the message.

ENG 235 12:N \ Unknown message code.
ENG 235 13:N /

ENG 235 14:N \ ZXO indicated as missed.
ENG 235 15:N /

The following item shows the requested lamp states just before the signals were switched off for any reason and thus may contain useful information if the controller has switched off after detecting a fault. This item is best displayed using 'BAS:3'...

ENG 235 16:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Reds
ENG 235 20:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Ambers
ENG 235 24:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Greens

237 TCSYCF – Time Clock UTC Sync. Flag

(ANY) ENG 237 0:N

A non-zero value indicates that the UTC clock sync. Input has just been accepted. Normally this flag drives the confirm bit directly if configured, but this item allows special conditioning to detect when the bit would have been set and thus return a modified confirm bit instead.

CODE **DESCRIPTION**

238 RTCONF – Real Time Clock Confirm Flag

(ANY) ENG 238 0:N

A non-zero value indicates that the UTC 'clock confirm time' has been reached. Normally this flag drives the confirm bit directly if configured, but this item allows special conditioning to detect when the bit would have been set and thus return a modified confirm bit instead.

239 FTCM_active – Fixed Time To Current Maximums Active

BAS:1 ENG 239 0:76543210

A bit set to '1' indicates that Fixed Time to Current Maximums is active on that stream (0-7). Note that Fixed Time to Current Maximums actually uses VA mode although the manual panel and the handset commands MOD and STS show the mode as Fixed Time.

240 LMUSTG – Stages Inhibited By Red Lamp Monitoring

BAS:3 ENG 240 0:10987654 32109876 54321098 76543210

A bit set to '1' indicates that red lamp monitoring has inhibited all the phases; see ENG 215, in that stage.

241 JNC_checksum – Junction Data Checksum

BAS:0 ENG 241 0:XX
ENG 241 1:XX
ENG 241 2:XX
ENG 241 3:XX

This four-byte item is the checksum for the junction configuration data held in the battery backed RAM. This data is not normally changeable using the handset (except when on-street configuration is enabled).

242 SAY_checksum – Timing Data Checksum

BAS:0 ENG 242 0:XX
ENG 242 1:XX
ENG 242 2:XX
ENG 242 3:XX

This four-byte item is the checksum for the timing configuration data held in the battery backed RAM. Data within this area can be changed using the handset

243 PHASE_ENABLES – Phases Enabled

BAS:3 ENG 243 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the phase is either fixed in the current stage, or is demand dependant and a demand has been accepted, and the phase is not inhibited by the red lamp monitor. Also see page 215.

CODE **DESCRIPTION**

244 INTERGREENS_EXPIRED – Intergreens Expired

BAS:3 ENG 244 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the intergreen timers have finished for that phase and remains set while any red lamp monitor delays are being timed off or the phase is not to appear, i.e. is not in PHASE_ENABLES.

Also see page 215.

245 LOSING_PHASES – Phases Which Lost Right Of Way

BAS:3 ENG 245 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the phase lost right of way during the stage movement. Like ENG 13, this information is set-up as the controller decides to make the stage move, but, unlike ENG 13, this item remains set until the next stage change.

246 RLM_DELAYS_EXPIRED – RLM Delay Timers Expired

BAS:3 ENG 246 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the red lamp monitor delay timer has expired (also see ENG 244). The bit is cleared when the phase is sent to green and thus it may only be set briefly. Also see page 215.

247 GAINING_PHASES – Phases Which May Gain Right Of Way

BAS:3 ENG 247 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the phase may gain right of way during the current stage movement. The bit is set at the start of the stage movement. It remains set until the phase actually starts to move to right of way, e.g. starts its red/amber period or the phase can no longer appear because the controller has now moved to a stage which no longer contains the phase. Also see page 215.

248 GPIPX – General Purpose Inputs Extended

BAS:1 ENG 248 0:XXXXXXXX – Extended inputs on port 0
ENG 248 1:XXXXXXXX – Extended inputs on port 1
.....
ENG 248 30:XXXXXXXX – Extended inputs on port 30

A bit set to '1' indicates that, that I/O line on the port is currently active, i.e. similar to 'ENG 25 – GPIN1', or that the input has been active and is currently running the extension time configured on that input using the handset command IPX.

The bit is cleared when the input goes inactive and the extension time, if any, has expired.

CODE **DESCRIPTION**

249 RIPCNG – Ripple Change Active

BAS:1 ENG 249 0:76543210

A bit set to '1' indicates that a ripple change is currently active on that stream (0-7).

The bit is set when the controller makes the first stage change while one stage change is already in progress and remains set until the controller finally resides in a stage.

250 RIPSTG – Stages Terminated By The Ripple Change

BAS:3 ENG 250 0:10987654 32109876 54321098 76543210

A bit set to '1' indicates that the controller has terminated that stage during the current ripple stage. It is used internally to check that all the stage moves from these stages to the suggested stage are not restricted since, to the street, it may look like the controller has performed any one of these stage moves.

251 LOSRWD – Phases To Lose Right Of Way Delayed

BAS:3 ENG 251 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that this phase is to lose right of way during the current stage movement and its losing phase delay (if any) has expired, in which case the phase would normal lose right of way immediately and the bit would not be seen set. The bit will only remain set if the phase is configured as termination type 1 or 2 and the phase is waiting until its associated phase gains or leaves right of way.

Also see ENG 245 – 'LOSING_PHASES' and page 215.

252 ESP_Active – Enhanced Serial Port Active

(ANY) ENG 252 0:N

A non-zero value indicates that the enhanced serial link to a Siemens OMU unit is active.

253 GPS_clock_counters

BAS:2 These four-byte counters are incremented when...

ENG 253 0:N \ a GPS clock synchronisation is
ENG 253 3:N / performed.

ENG 253 4:N \ a GPS time message is received with
ENG 253 7:N / valid status.

ENG 253 8:N \ a GPS time message is received but the
ENG 253 11:N / status is invalid (e.g. poor reception)

ENG 253 12:N \ a bad message is received (checksum
ENG 253 15:N / does not match)

ENG 253 16:N \ a character is received from the GPS
ENG 253 19:N / unit.

CODE **DESCRIPTION**

254 PBNACT – Push-button Demands Active

BAS:3 ENG 254 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

Only for phases with kerbsides or ped demand delay.
Push-button unlatched demands seen with active kerbside inputs which will result in an unlatched demand.

255 KBSACT – Kerbside Inputs Active

BAS:3 ENG 255 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that one or more kerbside inputs (or their extensions) are active on that phase. Note: This information is only set-up for phases with kerbside detectors or pedestrian demand delays.

256 PBKLAT – Push-button and Kerbside Latch

BAS:3 ENG 256 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

Push-button/kerbside latch. Set when PBNACT set and cleared when KBSACT cleared and pedestrian demand extension (PDX) expires. Also set while PBNLAT is set (PB801 only). This item illuminates the wait indicators but does not demand the phase.

Also see:
ENG 197 – UNLPUF

257 ONCACT – On-crossing Detectors Active

BAS:3 ENG 257 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that one or more on-crossing detectors for the phase are active. The bit is cleared when all of the detectors assigned to the phase go inactive and their extension times have expired.

258 ONCBAD – On-crossing Detector Faulty

BAS:3 ENG 258 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that one or more of the configured detectors on this phase have not been seen active since the last pedestrian clearance period. The clearance period is therefore being forced to run to its maximum. Also see 'ENG 259 – ONCDOK' following...

CODE **DESCRIPTION**

259 ONCDOK – On-crossing Detector Checking

BAS:1

ENG 259 0:0000XXXX – inputs for phase A
ENG 259 1:0000XXXX – inputs for phase B
.....
ENG 259 31:0000XXXX – inputs for phase F2

A bit set to '1' indicates that the detector has been seen active since the end of the previous clearance period. If a bit is still clear when the clearance period starts, ONCBAD is set for the phase and the clearance period is forced to run to its maximum.

260 PBTTMA – Pedestrian Minimum Clearance Period Active

BAS:3 ENG 260 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the PBT pedestrian minimum clearance period is running for that phase. The bit is cleared when this period is no longer running.

261 CMXTMA – Pedestrian Extendable Clearance Period Active

BAS:3

ENG 261 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the CMX pedestrian extendable clearance period is running for that phase. The bit is cleared when this period is no longer running.

262 CDYTMA – Pedestrian Clearance Delay Period Active

BAS:3

ENG 262 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the CDY pedestrian clearance delay period is running for that phase. The bit is cleared when this period is no longer running.

263 CRDTMA – Pedestrian Clearance Red Period Active

BAS:3

ENG 263 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the CRD pedestrian clearance red period is running for that phase. The bit is cleared when this period is no longer running.

264 PARTMA – Pedestrian All Red Timer Active

BAS:3 ENG 264 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the Pedestrian All Red timer is active for that phase. The bit is cleared when this timer is no longer running.

CODE	DESCRIPTION

265 DOORSW1 – Door Switch Indication

(ANY) ENG 265 0:N

Zero indicates that the manual panel door or main cabinet door is open, or that no door switch mechanism is fitted. A non-zero value indicates that a switch is fitted and the doors are closed.

266 DFM_FLT_STATE – Detector Fault Monitoring Fault State

BAS:1 ENG 266 0:00XX00XX – inputs for I/O line 0
ENG 266 1:00XX00XX – inputs for I/O line 1
.....
ENG 266 247:00XX00XX – inputs for I/O line 247, where:

00000001 = DFM time-out fault has been reported
00000011 = The input has subsequently changed state
00010000 = Kerbside test fault has been logged
00110000 = The kerbside test has subsequently passed.

268 PRSFLS – Lamp Flashing States

BAS:3 ENG 268 0:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Reds
ENG 268 4:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Ambers
ENG 268 8:FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA – Greens

A bit set to ‘1’ indicates that the phase and colour has been requested to flash. Also see “ENG 194 PRSLMP”.

269 ESP_MOVA_Forc – Bits to/from a Serial MOVA/DUSC unit

BAS:1 ENG 269 0:0000000X – ‘TO’ bit.
ENG 269 1:87654321 – Force Bits F1 to F8
ENG 269 2:65432109 – Force Bits F9 to F16
3:43210987 - Force Bits F17 to F24
4:21098765 - Force Bits F25 to F32
5:0000000X - CRB Bit
6:87654321 - Confirm Bits 61 to 68
7:65432109 - Confirm Bits 69 to 616
8:43210987 - Confirm Bits 617 to 624
9:21098765 - Confirm Bits 625 to 632

CODE **DESCRIPTION**

270 HIPRMD – Higher Priority Mode Active

BAS:1 ENG 270 0:76543210 – (Mode 0 – not used)
ENG 270 1:76543210 – Fixed Time Mode
ENG 270 2:76543210 – VA Mode
ENG 270 3:76543210 – CLF Mode
ENG 270 4:76543210 – Manual Mode
ENG 270 5:76543210 – Hurry Call Mode
ENG 270 6:76543210 – UTC Mode
ENG 270 7:76543210 – Part Time Mode
ENG 270 8:76543210 – Start up Mode
ENG 270 9:76543210 – FVP Mode
ENG 270 10:76543210 – Step On Mode
ENG 270 11:76543210 – Select Switch Mode
ENG 270 12:76543210 – Emergency Vehicle Mode
ENG 270 13:76543210 – Bus Priority Mode
ENG 270 14:76543210 – Pelican VA Mode
ENG 270 15:76543210 – (Mode 15 – not used)

A bit set to '1' indicates that the mode is disabled or a higher priority mode is running on that stream (0-7). Therefore a '0' usually implies that the mode can run or is running on that stream.

271 SSWACT – Select Switch Mode Active

BAS:1 ENG 271 0:76543210

A bit set to '1' indicates that the mode selected by the manual panel is actually running on the corresponding stream (0-7). Also see 'ENG 76 – SSWMDE' which indicates which mode has been selected.

272 PTXTMA – Pre-Timed Maximum Extra Period Active

BAS:3 ENG 272 0: FEDCBAZY XWVUTSRQ PONMLKJI HGFEDCBA

A bit set to '1' indicates that the PTX time for the phase (see page 106) is currently running. Note that ENG 38 (MXAFAZ) will also show that the maximum green timer for the phase is active.

273 OMURUN – OMU Available Flag

BAS:1 ENG 273

This item is set TRUE when an OMU is connected. When an OMU is connected the code stores away information into the Shared RAM area.

CODE	DESCRIPTION
275	ESPORT – ESP Debug Information (20 bytes)
BAS:2	ENG 275

Offset 0 : total number of bytes read
Offset 4 : no. of times ESP has been started
Offset 5 : no. of times first byte is not Start Of Message
Offset 6 : no. of times a too short or too long message has been received
Offset 7 : no. of times the message checksum has been wrong
Offset 8 : no. of times a message has stopped part way through
Offset 9 : no. of ... (internal errors)
Offset 10 : no. of messages with unknown type received
Offset 11 : no. of ping messages received
Offset 12 : no. of handset messages received
Offset 13 : no. of status requests received
Offset 14 : no. of faults requests received
Offset 15 : no. of MOVA messages received
Offset 16 : no. of UPDL message blocks received
Offset 17 : no. of UPDL message blocks rejected
Offset 18 : no. of messages with the same Message count
Offset 19 : no. of UPDL Telegram messages processed

276 TYCODB – TYCO Debug Information (6 bytes)

BAS:2 ENG 276

Offset 0 : indicates whether the TYCO interface has been requested
Offset 1 : 0 means receive state is idle; 1 means a partial messages has been received; 2 means the whole message has been received, start and end characters detected.
Offset 2 : indicates path taken in reading and writing characters. 1 & 4 indicate bad channel number; 2 & 5 indicate channel hasn't been initialised; 3 & 6 indicate success.
Offset 3 : total number of bytes received for the current message
Offset 4 : total number of bytes read
Offset 6 : total number of bytes sent.

277 TYCORX – TYCO Receive Buffer, last received message (100 bytes)

BAS:2 ENG 277

This item holds the message being received and processed.

278 TYCOTX – TYCO Transmit Buffer, last transmitted message (100 bytes)

BAS:2 ENG 278

This item holds the message to be transmitted.

280 DFMGRP_FAULTS – UTC 'DF' bit for each DFM group

BAS:1 ENG 280 0:76543210

1 byte. Bit 0 = DFM Group 0, to Bit 7 = DFM Group 7. A bit set to 1 = One or more detectors on that group have failed.

CODE **DESCRIPTION**

284 PBNLAT - Latched Push-Buttons

BAS:3 ENG 284 0:FEDCBAZY XWTUTSRQ PONMLKJI HGFEDCBA

Only for phases with kerbsides or ped demand delay, and only available with PB801. Push-button inputs active without kerbside active, which will result in a latched demand.

Also see:
ENG 254 – PBNACT ENG 256 – PBKLAT

285 DFMLOG – DFM Faults (1 = Failed) (as FLD20-31 on PB800)

One byte per I/O port (0-30) and one bit per I/O line.
Bit set to '1' = Input failed DFM.

286 DFMDSF0 – DFM Faults (0= failed inactive)

One byte per I/O port (0-30) and one bit per I/O line.
Bit set to '0' = Input failed DFM stuck inactive.

287 DFMDSF1 – DFM Faults (1= failed active)

One byte per I/O port (0-30) and one bit per I/O line.
Bit set to '1' = Input failed DFM stuck active.

290 IO_cards_ok – Good I/O Cards

16-bit item; Bit set to 1 = card is responding, e.g.
Bit0 = serial I/O card#1 or expansion I/O card#0.
Bit2 = serial I/O card#3 or expansion I/O card#2.
Bit3 = serial I/O card#4 (only).
Bit 14 = serial I/O card#15 (only).

291 SIOCP – Raw Serial I/O

6 bytes per I/O card, starting with I/O card #1. For each card, 4 bytes = Input ports (0-3), 2 bytes = Output ports (0-1).

0 = Card #1, Input Port 0 (1 = Open Circuit)
1 = Card #1, Input Port 1
2 = Card #1, Input Port 2 (see below)
3 = Card #1, Input Port 3
4 = Card #1, Output Port 0
5 = Card #1, Output Port 1
6 = Card #2, Input Port 0
…through to…
89 = Card #15, Output Port 1

For the detector backplane type of Serial I/O card, Input Port 2 is connected to the Detector Card Master Fault outputs (if provided) as follows:

Bit 0: Master Fault Normally Open Detector Card #1
Bit 1: Master Fault Normally Open Detector Card #2
Bit 2: Master Fault Normally Open Detector Card #3
Bit 3: Master Fault Normally Open Detector Card #4
Bit 4: Master Fault Normally Closed Detector Card #1
Bit 5: Master Fault Normally Closed Detector Card #2
Bit 6: Master Fault Normally Closed Detector Card #3
Bit 7: Master Fault Normally Closed Detector Card #4

14.5 Phase Sequence Steps

The diagram on the following page describes the various states a phase goes through before appearing at right of way and then returning to no right of way. It shows the interaction between several ENG items described in the previous section.

It does not include any information on how the controller determines the ‘next stage’ which actually controls which phases are to gain or lose right of way. The ‘next stage’ algorithm used by the firmware is described in the General Handbook.

This information should only be used as a guide as each version of the controller firmware may operate slightly differently.

The diagram starts at the top with a phase at no right of way. When a stage change is initiated, this phase may gain right of way if it resides in the destination (the ‘next’) stage. Regardless of whether the phase will actually appear, it starts ‘moving’ through the various states on its way to right of way. The major steps in the sequence are highlighted.

When the phase ‘moves’ from one step to the next, the appropriate bit for the phase is removed from one item and set in the next. For example, when the phase starts to gain right of way, the phase moves from ATNORW to GAINRW, i.e. the bit for the phase is removed from ATNORW and is set in GAINRW.

Once the phase has started this process and is either fixed in the stage or demanded the firmware will ensure that the phase keeps right of way (ENG 17 - FZKEEP). The controller may be allowed to make another stage change while this phase is still gaining right of way, but this phase must also reside in any new destination stage that is chosen.

Eventually the phase will start moving to right of way and then appear at green, or the controller will move to a stage which does not include the phase, if there is no demand for the phase or the phase is inhibited for example.

If the phase has been given right of way and then the controller moves to a stage that does not include the phase, the phase will lose right of way and eventually end up back at no right of way.

	State and Conditions for Movement	R.O.W.* STATE
1	**ATNORW (ENG 10)**	at no R.O.W.
	When the next stage includes this phase, go to 2.	
2	GAINRW (ENG 12)†	at no R.O.W.
	When the phase delay (if any) expires, go to 3.	
3	GAIRWD (ENG 14)†	at no R.O.W.
	Actioned immediately (go immediately to 4)	
4	**'Request Green' set in FAZCMD (ENG 1)**	at no R.O.W.
	When the intergreens expire, go to 5.	
5	INTERGREENS_EXPIRED (ENG 244)†	at no R.O.W.
	When the configured RLM delay expires, go to 6. If no delay and in PHASE_ENABLES, go to step 7.	
6	RLM_DELAYS_EXPIRED (ENG 246)†	at no R.O.W.
	If in PHASE_ENABLES (ENG 243), go to 7	
7	'Go Green' set in FAZCMD (ENG 1)†	at no R.O.W.
	Actioned immediately (go immediately to 8)	
8	**TORW (ENG 154)† and GIVNRW (ENG 11)**	Gaining R.O.W.
	When the lamp sequence finishes, go to 9	
9	**ROWFAZ (ENG 33) and GIVNRW (ENG 11)**	at R.O.W.
	When the phase is not in the next stage, go to 10	
10	LOSERW (ENG 13)†	at R.O.W.
	When the phase delay (if any) expires, go to 11	
11	LOSRWD (ENG 251)†	at R.O.W.
	When the phase leaving type condition is met, go to 12	
12	'Go Red' set in FAZCMD (ENG 1)†	at R.O.W.
	Actioned immediately (go immediately to 13)	
13	**TONORW (ENG 124)**	Leaving R.O.W.
	When the lamp sequence finishes, go back to the top.	

† Short activations may not appear on the handset

* Abbreviation for 'Right Of Way'

Note: The Index for this document is located in section 13 (starting on page 141), which is before the Appendix on the Engineering commands.

LAST PAGE OF THE HANDSET HANDBOOK